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U.S. DEPARTMENT OF
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JANUARY 1968
VOLUME 3, No. 1
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Special Notice

The National Institute of Arthritis and Metabolic Diseases regrets the time which has elapsed since the last issue (Volume 2, Number 12, December 1967) which was caused by circumstances quite beyond our control. While this issue, dated January 1968 (but with the statement that it was published in June 1968), contains relatively current coverage of the literature, there is no intent that a hiatus continue to exist between the literature covered by the December 1967 issue and this one. This hiatus will, most likely, be taken care of by a special supplement, so that subsequent 1968 issues will be as current as possible. We appreciate your patience and understanding during the time in which regular issues of GASTROENTEROLOGY ABSTRACTS and CITATIONS were not appearing.

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GASTROENTEROLOGY ABSTRACTS AND CITATIONS

A monthly publication of the
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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available, free to qualified interested investigators and practitioners, citations of all current papers relevant to this field from virtually every medical journal published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis and Metabolic Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus.* For journals not covered by *Index Medicus,* the abbreviations (with some modifications) found in *World Medical Periodicals,* 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans
Ar.	Arabic
Bul.	Bulgarian
Ch.	Chinese
Cz.	Czech
Dan.	Danish
Dut.	Dutch
E.	English
Eston.	Estonian
Fin.	Finnish
Fr.	French
Ger.	German
Gr.	Greek
Heb.	Hebrew
Hun.	Hungarian
Ic.	Icelandic
In.	Indonesian
It.	Italian
Jap.	Japanese
Kor.	Korean
Latv.	Latvian
Lith.	Lithuanian
Nor.	Norwegian
Pol.	Polish
Por.	Portuguese
Rum.	Rumanian
Rus.	Russian
Ser.	Serbo-Croatian
Sl.	Slovak
Sp.	Spanish
Sw.	Swedish
Th.	Thai
Turk.	Turkish
Uk.	Ukrainian
Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
ATP	adenosine triphosphate
C	degrees centigrade
cm	centimeter(s)
CNS	central nervous system
cpm	counts per minute
DNA	deoxyribonucleic acid
e.g.	for example
g	gram(s)
μg	microgram(s)
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kg	kilogram(s)
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar
mEq	milliequivalent(s)
mM	millimolar
μM	micromolar
mC,μC	milli-, microcurie(s)
mg	milligram(s)
min	minute(s)
ml	milliliter(s)
mm	millimeter(s)
MTD	maximum tolerated dose
ng	nanogram (10^{-9})
pg	picogram (10^{-12})
p.o.	orally
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes)
resp.	respectively
Rev.	review (only in cite)
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
WBC	white blood cells (leukocytes) or count
yr	year(s)

PRE-CLINICAL SCIENCES
GENERAL

1 **DIFFERENCES IN LACTATE DEHYDROGENASE ISOENZYME PATTERNS IN FUNDUS AND PYLORUS OF THE RAT STOMACH.** *(E.)* Prochazka, B. (Charles Univ., Prague, Czech.), V. Jirasek, V. Barta, J. Kohout, L. Korbova, A. Schlupek and Z. Slezak. *Gastroenterology* 54(1): 50-64, 1968.

LDH (lactate dehydrogenase) isoenzyme patterns were used to determine the types of metabolism in different stomach areas in the pooled fundic and pyloric mucosa and corresponding muscular layer samples of 12 rats; the specimens from 2 rats formed each pool. All specimens were histologically examined and no pathological changes were observed. Homogenates were used to determine LDH activity. Isoenzyme patterns were elucidated by agar gel electrophoresis. Fundic and pyloric mucosa LDH showed different isoenzyme patterns. The faster moving isoenzymes (LDH 1, LDH 2, and LDH 3) were localized mainly in the fundic mucosa, while the slowly moving isoenzyme (LDH 5), was found mainly in the pyloric mucosa. LDH 4 was evenly distributed in both tissues. The LDH isoenzyme pattern in the fundic mucosa differed from that in the fundic muscular layer only with respect to LDH 4 percentage which was higher in the muscular layer. The percentages of LDH 3 and LDH 4 were higher in the pyloric muscular layer than in the pyloric mucosa; LDH 5 was higher in the mucosa. There was a higher percentage of LDH 5 in the pyloric muscular layer as compared to the fundic muscular layer. The difference in LDH isoenzymes in the fundic and pyloric mucosa are probably due to the type of metabolism in each; aerobic in the fundus, and anaerobic in the pylorus. The difference between the LDH isoenzyme patterns in the 2 muscular layers is probably due to slight contamination with the adjacent mucosa during preparation.

2 **ACTIVE SUBSTANCES IN THE BLOOD DURING STIMULATION OF THE CENTRAL VAGUS NERVES.** *(E.)* Tomiyama, Y. (Michael Reese Hosp. and Med. Center, Chicago, Ill.), A. Giesal, N. C. Jefferson, P. Lott, Jr. and H. Necheles. *Gastroenterologia* 108(5):261-267, 1967.

Alcohol precipitation and gel column chromatography were used to study blood fractionation before and after vagus nerve stimulation in 25-30 kg anesthetized mongrel dogs, deprived of H_2O for 18-24 hrs. Femoral or jugular vein blood was collected in heparinized, siliconized tubes. Stomach pressure and blood pressure were recorded. The vagi were cut and attached to bipolar electrodes, which were connected to a Grass square wave stimulator (frequency, 15-60 cps; pulse interval, 2 msec; pulse duration 2 msec; period, 5-10 min; potential difference 0.15-10 v). Blood samples of 100 ml were collected before any procedure, when the vagi were exposed and cut, and 1-2 hrs later when the cut ends were stimulated. Lyophylizates of alcohol-precipitated lipids were centrifuged, and 2 ml of supernatant chromatographed on a gel column and eluted with physiological saline into 20 2.5 ml-fractions. The optical density at 280 mμ and the Na and K content (flame photometry) were determined. Ileal strips from fraction-injected guinea pigs and uterine horn samples from estrogen-injected albino rats were suspended in organ baths and the activity of 0.5 ml of eluates tested on them. Contractile responses were recorded and compared to those obtained with 400 ng of bradykinin. Ileum samples were used to assay acetylcholine and histamine activity; and uterus specimens, to determine bradykinin, serotonin, and epinephrine activity. Activities were checked by blocking with the antagonists atropine, mepyramine maleate, and LSD-25 (lysergic acid diethylamide). There was no appreciable difference in spectrophotometric patterns of controls and samples obtained after stimulation. Electrolytes could not be separated from the major peak at 280 mμ. Two different contractile peaks of control and stimulation samples were seen in Fractions 4 and 6. Activity was not abolished in either ileum or uterus with antagonists, but the peak of Fraction 8, seen only in the stimulation sample, was abolished by mepyramine. Similar pattern responses were seen in Fractions 4, 6, and 8, when the nerves were cut and stimulated. Acetylcholine and bradykinin overlap in Fraction 6 was separated by adding atropine to the bath solution. Histamine appeared in Fractions 8 and 9, and epinephrine in Fractions 12 and 13. Results show that activity in Fractions 4 and 6 in samples obtained after stimulation, is due to a humoral factor, tentatively called "Brain Factor," which, judging by its fractionation qualities, is polypeptide in nature, with a larger molecular weight than bradykinin.

3 **BACTERIAL DEGRADATION OF GASTROINTESTINAL MUCINS: II. BACTERIAL ORIGIN OF FECAL ABH(O) BLOOD GROUP ANTIGEN-DESTROYING ENZYMES.** *(E.)* Hoskins, L. C. (Vet. Admin. Hosp., Cleveland, Ohio). *Gastroenterology* 54(2):218-224, 1968.

The origin of BGD (blood group-destroying) enzyme activity was investigated in unfasted germ-free and conventional rats. Conventional, but not germ-free, rat stools contained BGD enzyme activity; this activity developed in liquid anaerobic bacterial cultures of stool and cecal contents during 72-hr incubation at 37C. Stomach, pancreas, liver, small intestinal mucosa, and cecal and colonic mucosa homogenates failed to show BGD enzyme activity. Jejunal mucosa obtained by peroral biopsy from one human subject who consistently showed fecal BGD enzyme activity had no demonstrable BGD activity. It is concluded that fecal blood group-destroying enzyme activity arises from intestinal microorganisms.

4 **GASTRIC MUCOSAL BLOOD FLOW: MEASUREMENT BY FICK PRINCIPLE.** *(E.)* Rosenkrantz, J. G. (U. Colorado Med. Ctr., Denver), R. C. Simon and W. R. Waddell. *J. Surg. Res.* 8(3):138-141, 1968.

A method is presented for measuring gastric mucosal blood flow by applying the Fick principle to the movement of an inert gas from the stomach into the blood stream. The stomach of fasting dogs was cannulated after ligation of the abdominal esophagus and pylorus; the ligature omitted the vagus nerves. The stomach was emptied and filled with ethyl chloride gas. After 30 min the stomach was again emptied and 100 ml of gas was introduced. At the beginning and end of each 15 min run, ethyl chloride concentration in samples of gas from the stomach was measured by gas chromatography. A significant loss of ethyl chloride occurred in 15 min. In 5 dogs, ligation of all the gastric arteries before a second run reduced the rate of gas loss from the stomach. In 3 dogs detectable quantities of the gas appeared in portal venous blood.

GENERAL

5 BACTERIAL DEGRADATION OF GASTROINTESTINAL MUCINS. I. COMPARISON OF MUCUS CONSTITUENTS IN THE STOOLS OF GERM-FREE AND CONVENTIONAL RATS. *(E.)* Hoskins, L. C. (Harvard Sch. Med., Boston, Mass.) and N. Zamcheck. *Gastroenterology* 54(2):210-217, 1968.

Fecal extracts from 3 germ-free and 3 conventional rats fed 10% w/v glucose in Ringer's solution were analyzed for hexoses, hexosamines, methyl pentoses, sialic acids and total nitrogen to determine the amounts of gut mucus constituents excreted in feces, and to show that fecal bacteria degrade mucus constituents in germ-free rats. To measure consumption of gut mucus constituents by intestinal microorganisms, fresh stool from conventional rats was introduced into a sterile liquid culture medium containing nondialyzable constituents of germ-free rat stools. Consumption was determined by comparing constituent concentrations in the medium initially and 48 hr after anaerobic bacterial growth. Carbohydrates are the major components of the nondialyzable fraction from germ-free rats; proteins are the major components of conventional rat nondialyzable fractions. Each nondialyzable carbohydrate is more abundant in the germ-free rat stool than in the conventional rat stool. The germ-free rats excreted more dialyzable carbohydrate than conventional rats; a significant portion of this carbohydrate was glucose, presumably from the diet and undegraded by intestinal bacteria. Anaerobic incubation of rat fecal microorganisms decreased carbohydrate concentration by 75-90% and decreased protein concentration by 20%. It is concluded that intestinal microorganisms degrade gastrointestinal mucins, particularly carbohydrate moieties.

6 PRODUCTION OF GASTRIC LESIONS IN RATS BY COMBINED COLD AND ELECTROSTRESS. *(E.)* Rosenberg, A. (Riker Lab., Northridge, Calif.). *Amer. J. Dig. Dis.* 12(11):1140-1148, 1967.

Electrostress was provided by keeping adult male rats in cages the floor of which consisted of a grid of parallel stainless steel bars 2 mm in diameter and spaced 1 cm apart. An electric shocking device delivered 60 pulses/sec with a peak current of 2.5 mamp via alternate bars. When these cages were maintained in a cold room kept at 5-8C, maximum number of gastric lesions were produced after a 12-hr exposure (82% lesions in 320 controls). Separate exposure to either stress alone was largely ineffective. The cold-electrostress lesions were significantly reduced by atropine and propantheline. Of a group of central depressants tried, chlorpromazine at a low dose (2 mg/kg) reduced the number of lesions while a dose of 5 mg/kg did not; two barbiturates (phenobarbital and pentobarbital), chlordiazepoxide, and meprobamate gave no protection. In a separate series, when an insulated platform was provided in the cages, administration of atropine reduced the incidence of lesions while chlorpromazine and chlordiazepoxide gave little or no protection. In this series of experiments, it is believed a psychological factor was operative in the production of lesions.

7 INTESTINAL COMPLIANCE. *(E.)* Chou, C. C. (Dept. Physiol., Michigan State U., East Lansing) and J. M. Dabney. *Amer. J. Dig. Dis.* 12(12):1189-1197, 1967.

Intestinal compliance was measured in exteriorized *in situ* segments of dog ileum which were perfused at constant blood flow with the use of an extracorporeal circuit. Intraluminal pressure changes were noted as the dimension of the segment was altered by infusing stepwise measured volumes of water into a long balloon within the segment. As balloon volume was increased, there was a concurrent increase in perfusion and intraluminal pressure. Ileal wall became more distensible (compliance was increased: change in volume/change in pressure) as it was repeatedly stretched during early measurements; eventually distensibility became steady. Hemorrhage or epinephrine infusion (12 μg/min i.v.) increased ileal compliance. Vascular resistance in the segment was not significantly changed by the epinephrine but was increased by hemorrhage.

8 INTERRELATION OF ILEAL WALL COMPLIANCE AND VASCULAR RESISTANCE. *(E.)* Chou, C. C. (Dept. Physiol., Michigan State U., East Lansing) and J. B. Dabney. *Amer. J. Dig. Dis.* 12(12):1198-1208, 1967.

The effects of alterations in local blood flow and of low doses of various agents on ileal wall compliance were studied in the previously described exteriorized, constantly perfused, but *in situ* segments of 40 dogs. Compliance (ml/mm Hg) was not significantly altered from control values of 1.96-2.33 during periods of low or high blood flow or no flow at all. Vascular resistance was decreased by high flow. Drugs were infused intra-arterially in doses which did not change ileal intraluminal pressure. Epinephrine increased compliance without altering vascular resistance while acetylcholine, bradykinin, adenosine or ATP decreased both compliance and vascular resistance. Serotonin decreased compliance but did not alter vascular resistance. A single bolus of epinephrine (0.5 μg) increased or decreased vascular resistance depending on the contractile state of the ileum. One microgram of acetylcholine decreased vascular resistance with minimal change in ileal intraluminal pressure while 10 μg produced concurrent rise and fluctuation in vascular resistance and ileal luminal pressure.

9 MANOMETRIC CHARACTERISTICS OF THE HUMAN ILEOCECAL JUNCTIONAL ZONE. *(E.)* Cohen, S. (New Eng. Med. Ctr. Hosps., Boston, Mass.), L. D. Harris and R. Levitan. *Gastroenterology* 54(1):72-75, 1968.

The manometric characteristics of the ileocecal junction were studied in 5 patients, aged 28-52 yr, free of any known bowel disease but undergoing other surgical procedures affording ready access to the ileocecal junction. Intraluminal pressure was monitored with a water-filled recording catheter connected to a Sanborn transducer. The recording tube was moved through the ileocecal junction in 1-cm increments. A 4-cm zone of elevated pressure was consistently demonstrated at the junction. Pressure was decreased when an ileal balloon was distended and increased when a colonic balloon was distended. It is concluded that the ileocecal junction meets the manometric criteria established for an alimentary tract sphincter.

10 EXPERIMENTS WITH THIOACETAMIDE IN DOGS. *(Sp.)* Olleros, A. R. (Puerto Rico U., Rio Piedras), J. E. Taveras and A. A. Delanoy. *G.E.N.* 22(1): 5-20, 1967.

See also abstract no.: 13

CELLULAR STRUCTURE AND MORPHOLOGY

11 **RAT INTESTINAL MICROVILLUS MEMBRANES: PURIFICATION AND BIOCHEMICAL CHARACTERIZATION.** *(E.)* Forstner, G. G. (Dept. Med., U. Toronto, Canada), S. B. Sabesin and K. J. Isselbacher. *Biochem. J.* 106(2):381-390, 1968.

Maximum purification of the crude rat small intestine microvillus preparation (technique of Miller and Crane) occurred after addition of 90-150 mM NaCl followed by aggregation of nonbrush material by means of glass wool. Purity was judged by invertase activity increase, microscopic homogeneity, and low nucleic acid content. Membrane fractions were relatively stable in invertase specific activity and cholesterol and phospholipid content. The membrane fraction appeared to be the locus of action of alkaline phosphatase, leucine aminopeptidase, Mg^{++} and Ca^{++}-dependent ATP-ase and 7 distinct disaccharidases. The fibrillar fraction contained about 30% of the total protein of purified brush borders, plus most of the residual nucleic acid contaminant. None of the brush border enzymes examined were located in the fibrillar fraction; nor were cholesterol and phospholipid found there.

12 **SURFACE AREA OF THE SMALL INTESTINE IN MAN.** *(E.)* Wilson, J. P. (Middlesex Hosp. Med. Sch., London, England). *Gut* 8(6):618-621, 1967.

To measure small intestine surface area, 6 intestinal necropsy specimens were fixed in formol saline for 24 hr and two 4-cm samples, 1 circumferential and 1 longitudinal, were cut at measured intervals from the duodenojejunal flexure. After being embedded in paraffin, 5 sections were cut and stained with hematoxylin and eosin. Tracings, made by projecting sections onto paper at a linear magnification of 100, were measured with an opisometer calibrated in cm. Study of the 6 specimens showed that surface area decreases sharply from proximal to distal intestine.

13 **INCORPORATION OF THE ^3H-THYMIDINE IN THE EPITHELIAL CELLS OF THE GASTROINTESTINAL TRACT OF HEPARINIZED MICE.** *(E.)* Rasanen, T. (U. Helsinki, Finland) and A. Lahtiharju. *Acta Path. Microbiol. Scand.* 71(1):21-24, 1967.

Glandular stomach, duodenum, ileum and colon specimens, as well as liver, kidney and skin samples were taken from 18 white mice (weighing 24-26 g) that had received 0.1 ml saline with or without 50 or 150 IU of heparin 6 hr before sacrifice, and 2 μC/g of ^3H-thymidine intraperitoneally 1 hr before sacrifice. The specimens were fixed in 4% formalin and cut into 4μ sections. Autoradiographic studies of skin and gastric mucosa revealed that ^3H-incorporation was significantly decreased after the larger heparin dose; heparinization did not affect incorporation in the duodenum, ileum, or colon. Incorporation in liver and kidney was decreased, but the difference was not significant. Reduced ^3H-thymidine incorporation in the skin and liver of heparinized mice reveals an inhibition of DNA synthesis. Endogenous heparin liberation in acute stress may retard the healing of gastric lesions by slowing down mucosa regeneration.

14 **ADDITIONAL ANIMAL EXPERIMENTS ON THE FORMATION OF SPECIFIC ANTIBODIES AGAINST HOMOLOGOUS AND AUTOLOGOUS LIVER TISSUE. II. HISTOLOGICAL FINDINGS AND THE RESULTS OF FLUORESCENCE SEROLOGY.** *(Ger.)* Scheiffarth, F. (U. Hosp., Erlangen, Germany), H. Warnatz, H. Götz and H. Rotsch. *Z. Gastroent.* 5(6):381-385, 1967.

Intraduodenal administration of CCl_4 had little effect, by itself, on the livers of adult rabbits. When this was followed by sensitization with homologous liver extract and Freund's adjuvant, however, autopsy 7 months later revealed splenomegaly and liver parenchymal damage resembling although not identical with that of chronic hepatitis. The liver sections showed parenchymal cell necrosis, periportal mononuclear infiltration and increased numbers of Kupffer cells, and fluorescence microscopy after incubation with fluorescein-isothyocyanate-labeled globulins revealed cytoplasmic fluorescence in the liver parenchyma and the renal tubular epithelium. No such fluorescence was seen in nonsensitized animals, indicating that CCl_4 poisoning does not result in the release of circulating antibodies against liver tissue. On the other hand, the effects of sensitization were significantly more marked in the rabbits that had received CCl_4 than in the controls. The precise role of autoimmune processes in the etiology of human hepatitis remains unclear.

15 **VARIATIONS IN THE CYSTIC DUCT AND THE LOWER BILIARY CONFLUENCE.** *(Ser.)* Nikolic, V. (Inst. Anat., Zagreb Univ. Med. Sch., Zagreb, Yugoslavia). *Lijecn. Vjes.* 89(9):683-695, 1967.

Studies of 250 specimens of the hepatic peduncle dissected *in situ* revealed marked variations in the size and shape of the cystic duct and its junction with the common bile duct. The length of the cystic duct varied from 0.5 to 11.0 cm, 76.4% of the cases having a duct between 2 and 5 cm in length while 10.4% had a short duct and 13.2% had a long duct. With regard to the junction between the cystic duct and the common bile duct, this was found to take place either at or as far as 8 cm from the upper biliary confluence, but in 80% of the cases the junction was 1-4 cm from the upper biliary confluence. It is also of considerable practical significance that the junction was supraduodenal or in the boundary zone of the duodenum in 90% of the cases. Some of the variations in the relationships between the cystic duct, the pancreas, the main biliary tree and the arteries of the hepatic peduncle are also discussed.

16 **ON KINETICS OF CELL POPULATION OF SMALL INTESTINE CRYPTS IN MICE SUBJECTED TO X-RAY IRRADIATION.** *(Rus.)* Kononenko, A. M. (Cent. Sci. Res. Inst. Roentgenol. Radiol. Min. Health USSR, Leningrad). *Arkh. Anat.* 53(12):27-32, 1967.

17 **ULTRASTRUCTURAL ASPECTS OF KUPFFER CELLS IN PARTIALLY HEPATECTOMIZED RATS.** *(It.)* Melis, M. (Inst. Anat. Path. Hist., Rome U., Italy) and L. Orci. *Fegato* 13(3):356-366, 1967.

CELLULAR STRUCTURE AND MORPHOLOGY

18 **HISTOENZYMATIC DEMONSTRATION OF GGTP DISTRIBUTION IN BIOPTIC SPECIMENS FROM HUMAN GASTROINTESTINAL TRACT.** *(E.)* Gibinski, K. (Silesian Sch. Med., Katowice, Poland), A. Nowak and D. Kochanska. *Gastroenterologia* 108(4):219-225, 1967.

19 **HISTOCHEMICAL AND ELECTRON MICROSCOPICAL DEMONSTRATION OF IRON IN THE INTESTINAL MUCOSA OF MAN.** *(E.)* Malinsky, J., J. Blatny and Z. Kojecky. *Folia Morphol.* 13(3):300-304, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

20 **MORPHOLOGY OF THE PORTAL VEIN IN CHRONIC HEPATITIS.** *(Fr.)* Abeatici, S. (Torino, Italy) and L. Campi. *Cesk. Radiol.* 19(4/5):318-323, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

ABSORPTION

21 **FLUXES OF INORGANIC IONS ACROSS THE ISOLATED INTESTINAL EPITHELIUM OF THE GREEK TORTOISE.** *(E.)* Gilles-Baillien, M. (U. Liege, Belgium) and E. Schoffeniels. *Arch. Int. Physiol.* 75(5):754-762, 1967.

Isotopic sodium, potassium, chloride, and sulfate ion fluxes were studied in isolated intestinal epithelium of the Greek tortoise mounted in a perspex apparatus. The sodium net flux toward the serosa was greater than the corresponding short-circuit current in both small intestine and colon, indicating either active transport of another cation in the opposite direction or of an anion in the same direction. Fluctuations observed in unidirectional jejunal and colonic potassium fluxes were not eliminated by prolonging the experimental period. Nonetheless it was shown that the potassium ion contribution to the short-circuit current required to abolish the potential difference is small. In the jejunum, the serosal-to-mucosal (outward) chloride flux was greater than the influx; in the colon, the chloride net flux was toward the serosa. An active transport is confirmed in both intestinal areas. Gastric mucosa was studied to confirm the link between active chloride transport and an opposed active bicarbonate transport. These studies used Diamox (acetazolamide), which inhibits the production of intracellular bicarbonate ions by carbonic amhydrase. Diamox decreased chloride secretion in the gastric mucosa, and lowered chloride influx and outflux in the jejunum and colon sufficiently to reverse the net flux in the jejunum but not in the colon. In the jejunum sulfate influx was greater than outflux but in the colon they were the same, implying active transport in the jejunum and passive transport in the colon. Various ionic species are thus shown to contribute to maintenance of the bioelectric potential across tortoise intestine. Sodium, chloride, and sulphate are actively transported in the jejunum, while only sodium and chloride are actively transported in the colon, where sulfate is passively transported. Still other ionic species must be involved, since there remains a discrepancy between short-circuit current and ion flux measurements in this experiment.

22 **EFFECT OF CHOLERA TOXIN ON WATER AND ION FLUXES IN THE CANINE BOWEL.** *(E.)* Shallow, J. H. (Mayo Clinic, Rochester, Minn.), C. F. Code and R. Freter. *Gastroenterology* 54(1):35-40, 1968.

The effects of 20 and 40 mg of cholera toxin and various sera were studied in healthy, well trained, fasting unanesthetized dogs with Thiry-Vella loops prepared from the proximal jejunum in 3 dogs, the distal ileum in 2 dogs, and the colon in 2 dogs. Test solutions were introduced through multiperforated catheters in segments occluded by balloons. Labeled bicarbonate (^{14}C), sodium (^{24}Na), and tritiated water were added to the test solution for determination of unidirectional fluxes. Introduction of cholera toxin reduced absorption and produced enterosorption of water, sodium, chloride, and bicarbonate and increased exsorption of potassium when placed in jejunal loops. Studies of different jejunal loops showed that accumulation of water and sodium in the lumen was the result of an alteration in the balance between their insorption and exsorption rather than any consistent effect on their unidirectional fluxes. Toxin increased CO_2 exsorption. Distal ileum and colon segments only reacted to massive doses of toxin. Antitoxin from rabbits injected with live (but not killed) *Vibrio cholerae* neutralized the effect of the toxin on jejunal sorption.

23 **RATE-LIMITING STEPS IN STEADY-STATE INTESTINAL ABSORPTION OF TRIOCTANOIN-1-^{14}C: EFFECT OF BILIARY AND PANCREATIC FLOW DIVERSION.** *(E.)* Bennett Clark, S. (St. Luke's Hosp. Ctr., New York, N.Y.) and P. R. Holt. *J. Clin. Invest.* 47(3):612-623, 1968.

Studies were performed in large, male Wistar rats prepared 48 hr before experiment by operations which made possible the diversion to the exterior of bile and/or pancreatic secretions. A steady state of intestinal absorption was achieved during continuous intraduodenal infusion of emulsified fat into conscious, restrained rats. The maximal steady-state of labeled trioctanoin was unaltered by bile diversion. After both pancreatic and bile diversion absorption was still one-third as rapid as in controls; mucosal uptake appeared to occur as unhydrolyzed triglyceride. During pancreatic diversion the returning of bile to the lumen did not increase rate of absorption. Turnover times for passage of labeled lipid through mucosal cells were calculated after determination of the concentration and rate of flow of abdominal thoracic lymph, and portal and aortic plasma. Mucosal turnover time in control and bile-diverted rats was about 4 min and about 20 min after pancreatic diversion. The rat-limiting step in octanoic acid absorption in control and bile-diverted rats was probably mucosal penetration. During absorption of unhydrolyzed triglyceride by pancreatic flow-diverted rats, both passage from the lumen into the mucosal cell and intracellular lipolysis were rate-controlling elements.

24 **SOLUBILIZATION OF SUGARS IN NON-POLAR SOLVENT BY INTESTINAL LIPIDS: POSSIBLE RELATION TO MEMBRANE TRANSPORT.** *(E.)* Baker, R. D. (Dept. Physiol., U. Texas Med. Branch, Galveston). *Texas Rep. Biol. Med.* 25(2):223-239, 1967.

Small intestine lipid extracts from male Swiss mice were used to solubilize ^{14}C-labeled sugars in hexane by a procedure similar to LeFevre's. For ^{14}C-galactose, the maximum solubilization ratio was 8.3 μmoles lipid phosphate per μmole of hexane (average of 10 experiments). Stoichiometric studies of galactose-phosphate interaction showed that below about 3 μM phospholipid in hexane little or no galactose was solubilized, while at higher phospholipid concentrations the ratio of solubilized galactose to lipid phosphate increased to a maximum at about 100 μM. This stoichiometric behavior is consonant with solubilization by incorporation into micelles and does not indicate the presence of a membrane carrier. Phlorizin (0.133, 0.515 or 1.648 μmoles/ml) inhibited galactose solubilization in hexane. Study of the ability of intestinal lipids to solubilize 3 additional sugars showed mannose to be solubilized significantly better than mannitol, galactose, and urea; and mannitol and 3-O-methylglucose to be solubilized significantly better than galactose and urea. Filtration of the hexane solution through Whatman No. 5 paper markedly decreased D-mannitol and urea solubilization without affecting D-mannose, D-galactose, and

3-O-methyl-D-glucose solubilization. Extracts from various levels of the small intestine did not differ consistently in ability to promote the solubilization of galactose in hexane.

25 STUDIES ON THE INTESTINAL ABSORPTION OF D-XYLOSE IN GERIATRIC SUBJECTS. *(It.)* Michetti, P. (Inst. Med. Path. U. Genoa, Italy). *Riv. Gastroent.* 19(1):28-36, 1967.

Measurements of the blood and urinary pentose levels following the oral administration of 25 g of D-xylose in 22 elderly and 29 young subjects (over 65 yr of age and between 18-40, resp.) revealed no significant difference between the two groups in the absorption of xylose. The urinary pentose excreted in 5 hr was 4.2-6.5 g in the geriatric group and 5.1-6.8 g in the younger controls, being normal in 17 of the 22 and 16 of the 19 cases. Four of the geriatric patients showed subnormal urinary pentose excretion. The blood pentose levels during the first 2 hr after ingestion were essentially the same in both groups, with a maximum of 50 mg% in about 2 hr, but the subsequent decrease was more rapid in the younger subjects, reaching 10 mg% in 5 hr compared to 25 mg% in the geriatric group. These differences in excretion are ascribed to senile changes in kidney function.

26 EFFECT OF THE EXOCRINE PANCREATIC SECRETIONS ON IRON ABSORPTION. *(E.)* Kavin, H. (U. Witwatersrand, South Africa), R. W. Charlton, P. Jacobs, R. Green, J. D. Torrance and T. H. Bothwell. *Gut* 8(6):556-564, 1967.

Eighty-three adult Wistar rats, 16 mongrel dogs, and 40 adult patients (11 hematologically normal, 10 with idiopathic hemochromatosis, 8 with iron deficiency, 8 with chronic calcific pancreatitis, and 3 with fibrocystic pancreatic disease) were used in a double isotope radioiron absorption study to determine the effect of exocrine pancreatic secretion on iron absorption. Preliminary studies using ferrous sulfate or chloride and pancreatic extract showed that the ferrous ion was not firmly bound to any pancreatic extract component. After addition of pancreatic extract to isolated rat jejunum or duodeno-jejunal loops, iron absorption was not significantly altered as indicated by carcass counts. While iron absorption in rats was depressed when pancreatic and/or bile secretions were excluded, a nonspecific reduction in iron absorption was also seen after sham-operation. Intravenous pancreozymin (10 U) alone or with secretin (20 U) diminished iron absorption in rats. There was no effect with secretin alone or with smaller hormone doses. When the iron dosage was increased from 10 to 100 μg, neither hormone affected iron absorption. In 16 dogs given 2 U/kg of each hormone, iron absorption was reduced in 9, increased in 5, and not changed in 2. The differences were not statistically significant. No constant effect of pancreatic extract upon iron absorption was observed in the patients except in some of those with idiopathic hemochromatosis in whom absorption was reduced when the test-iron dose was administered with pancreatic extract. However, differences were small. While results do not explain why some chronic pancreatitis patients absorb iron excessively, they suggest that pancreatic exocrine secretions do not play an important role in the physiological control of iron absorption.

27 STUDIES ON THE INTESTINAL ABSORPTION OF A MEDIUM CHAIN FAT (TRIOCTANOIN) IN NORMAL AND PANCREATECTOMIZED DOGS. *(E.)* Schwabe, A. D. (Dept. Med., UCLA Sch. Med., Los Angeles, Calif.), V. D. Valdivieso, S. Merrill, C. Ortega, L. R. Bennett and J. C. Thompson. *Amer. J. Dig. Dis.* 12(11):1114-1121, 1967.

The absorption of intraduodenally instilled radioactive trioctanoin was estimated by continuously monitoring the expired $^{14}CO_2$ for 2.5 hr after administration of glyceryl trioctanoate containing 6 μC of label. In 30 control studies in 20 dogs the average recovery of label was 26.7% of the administered dose. In 7 dogs after pancreatectomy, this recovery was significantly reduced to 5.7%. A thoracic duct was created in 4 of the pancreatectomized dogs and lymph was collected after administration of radioactive trioctanoate and medium chain triglycerides. Thin-layer and gas lipid chromatography revealed no 8-carbon fatty acids or glycerides in the lymph. Liquid scintillation counting of the lymph revealed small amounts of activity. These studies indicate that trioctanoin absorption is retarded in the absence of pancreatic lipase but that fractional amounts of this lipid are absorbed via the portal circulation.

28 EFFECT OF LONG CHAIN TRIGLYCERIDE ON CHYLOUS TRANSPORT OF MEDIUM CHAIN FATTY ACIDS. *(E.)* Lee, D. S. (Inst. Nutrition Sciences, Columbia U., New York City), S. A. Hashim and T. B. Van Itallie. *Amer. J. Physiol.* 214(2):294-297, 1968.

The influence of long chain triglycerides on medium chain fatty acid chylous transport was studied in 22 male Sprague-Dawley rats (300-350 g) that underwent thoracic duct cannulation and gastrostomy tube insertion 3 days after starting a fat-free diet. The animals were divided into groups 48 hr after surgery and each group was placed on 1 of 6 test diets containing 10-100% tripelargonin and 0-90% safflower oil. The largest 48-hr recovery of triglyceride from chyle was in the group fed the 30% tripelargonin and 70% safflower oil diet; the highest lymph flow was also obtained in this group. Less than 1% of the tripelargonin administered was absorbed via intestinal lymph in triglyceride form when tripelargonin was given alone. The inclusion of long chain triglycerides in a meal can increase the proportion of medium chain triglycerides transported in chyle in glyceride form.

29 CHOLINE PHOSPHATIDES AT THE ABSORPTION AND TRANSPORT OF LIPIDS. *(Cz.)* Lukes, J. and M. Lukesova. *Plzen. Lek. Sbor.* 25:35-46, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

30 STUDIES ON RECTAL CALCIUM ABSORPTION IN RATS. *(Ger.)* Brenner, G. (Lab. Biochem. Pharmacol., Johann A. Wülfing Co., Düsseldorf, Germany). *Arzneimittelforschung* 18(1):69-71, 1968.

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31 *IN VIVO* CALCIUM TRANSPORT BY SMALL RAT INTESTINE. *(E.)* Krawitt, E. L. (U. Iowa, Iowa City) and H. P. Schedl. *Amer. J. Physiol.* 214(2):232-236, 1968.

32 EFFECTS OF MAGNESIUM IONS ON CALCIUM AND PHOSPHORUS METABOLISM. *(E.)* Clark, I. (Coll. Phys. Surg., Columbia U., New York City). *Amer. J. Physiol.* 214(2):348-356, 1968.

33 DIGESTION AND ABSORPTION OF INGESTED AND SECRETED PROTEINS LABELED WITH ^{75}Se-SELENOMETHIONINE AND ^{35}S-METHIONINE IN THE GASTROINTESTINAL TRACT OF THE RAT. *(E.)* Ochoa-Solano, A. (Natl. Polytech. Inst., Mexico City, Mexico) and C. Gitler. *J. Nutr.* 94(2):249-255, 1968.

34 PROCEEDINGS OF THE 1967 DEUEL CONFERENCE ON LIPIDS, ON THE FATE OF DIETARY LIPIDS. *(E.)* Cowgill, G. (Pasadena, Calif.) and L. W. Kinsell. *P.H.S. Pub. No. 1742, Washington, D.C., 1968.*

35 STUDY TECHNIQUE OF INTESTINAL ABSORPTION IN MAN BY MEANS OF PERFUSION. *(Fr.)* Rambaud, J. C. (St. Lazare Hosp., Paris, France), J. D. Spaer and J. J. Bernier. *Arch. Mal. Appar. Dig.* 56(12):1249-1256, 1967.

36 ABSORPTION OF VITAMIN B$_{12}$ AND FOLIC ACID. (REVIEW). *(E.)* Herbert, V. (Mount Sinai Hosp., New York City). *Gastroenterology* 54(1):110-115, 1968

37 CHOLESTEROL AND LIPID LEVELS IN BLOOD AND LIVERS OF RATS FED UNSATURATED FATS. *(E.)* Pawar, S. S. (U. Texas Southwest Med. Sch., Dallas) and H. C. Tidwell. *Amer. J. Physiol.* 213(6):1350-1352, 1967.

38 HYPOTHALAMIC REGULATION OF SODIUM INTAKE: RELATIONS TO PREOPTIC AND TEGMENTAL FUNCTION. *(E.)* Wolf, G. (Rockefeller U., New York, N.Y.). *Amer. J. Physiol.* 213(6):1433-1438, 1967.

39 A GASTRIC FACTOR POTENTIATING IRON ABSORPTION. *(E.)* Murray, M. J. (Minneapolis, Minn.). *J. Lab. Clin. Med.* 70(5):866, Nov. 1967.

See also abstract no.: 117

SECRETION

40 **INTRINSIC FACTOR AND GASTRIC JUICE SECRETION INDUCED BY PENTAGASTRIN.** *(E.)* Tura, S. (Univ. of Bologna, Bologna, Italy), P. R. Dal Monte, F. Possati and E. Fiore. *Gastroenterologia* 108(5): 268-274, 1967.

The physiological action of pentagastrin was verified in 7 healthy, fasting subjects, aged 20-25 yr. After gastric emptying, a 30-min basal gastric secretion was obtained. Histamine bichloride was administered (0.03 mg/kg) with an antihistamine, mepyramine (100 mg). Gastric collections were made every 15 min for 1½ hr. Gastric secretion was stimulated on following days by pentagastrin (6 μg/kg). Parameters investigated were vol, pH, total acidity, pepsin, and intrinsic factor. The maximum acid activity is reached between 30 and 45 min for both histamine and pentagastrin, although the pentagastrin response was more rapid and greater. Pepsin secretion reached its peak in 15 min with both substances, but the pentagastrin response was greater. Maximum production of intrinsic factor is reached between 15 and 30 min, the pentagastrin response being greater. Total acidity was directly proportional to intrinsic factor secretion. No significant side-effects were seen with pentagastrin.

41 **GASTRIC SECRETION IN HYPOTHYROID ADULT RATS DURING THE INFUSION OF HISTAMINE FOR 24 HOURS.** *(E.)* Kowalewski, K. (U. Alberta, Edmonton, Alberta, Can.). *Gastroenterologia* 108(4):203-208, 1967.

Gastric secretory function was studied in 18 normal and 18 thiouracil-treated adult rats bearing permanent fistula and infused with saline or histamine. Gastric secretory volume, pH, free and total HCl, electrolytes and pepsin were determined in 24-hr gastric secretions. In the hypothyroid rats infused with saline, vol, acidity, HCl output, and pepsin were significantly lower than in the saline-infused controls. In the histamine-infused hypothyroid rats, volume acidity, and output of all studied components, except Na^+ were significantly lower than in histamine-infused controls. Pepsin output in both saline- and histamine-treated hypothyroid rats was significantly lower than in the controls. It is concluded that under the conditions of the experiment, post-thiouracil hypothyroidism in rats is associated with decreased gastric secretory function.

42 **RELATIONSHIP BETWEEN GASTRIC AND THYROID FUNCTION.** *(E.)* Dotevall, G. (U. Oklahoma Med. Ctr., Oklahoma City), V. Rohrer, R. Stefco and W. Price. *Amer. J. Dig. Dis.* 12(12):1230-1239, 1967.

The influence of thyroid function on acid secretion of the stomach was studied in 17 patients with hyperthyroidism and 16 with hypothyroidism. Studies were also performed on dogs with induced hyper- and hypothyroidism; both intact dogs and dogs with gastric pouches were employed. Some dogs were subjected to prior thyroidectomy. In response to histamine stimulation, 14 of the hyperthyroid and 13 of the hypothyroid patients showed markedly depressed acid secretion. There was good correlation between depressed acid secretion and mucosal pathology in biopsies. There was a modest increase in acid secretion in 3 of 4 dogs with intact stomachs and in 1 animal with a Heidenhain pouch for a period of 2-8 weeks after thyroidectomy. Acid secretion was depressed in dogs fed thyroid; this depression was not dependent upon the parasympathetic nervous system because Heidenhain pouch secretions showed the most pronounced depression.

43 **THE EFFECT OF ATROPINE AND SIMULTANEOUS STIMULATION ON SECRETION IN VAGALLY INNERVATED AND DENERVATED STOMACH SECTIONS (SECRETORY STUDIES ON DOGS WITH GASTRIC FISTULAS).** *(Ger.)* Lick, R. F. (Surg. Polyclin., U. Munich, Germany), W. Hart, R. Endriss and D. Balser. *Z. Gastroenterologie* 5(6):363-373, 1967.

In two dogs with a vagally denervated Heidenhain fundus pouch plus an innervated antral fistula, the stimulation of gastric secretion produced by food, neostigmine (0.025 mg/kg i.v.), insulin (0.4-0.6 U/kg i.v.), 2-deoxyglucose (125 mg/kg i.v.), gastrin (0.5 μg/kg i.v.) or oligopeptides (0.5 μg/kg s.c.) was practically completely abolished by atropine (0.025 mg/kg i.v.). In control experiments, atropine also decreased the volume, acidity and pepsin content of the gastric juice. Gastric secretion induced by histamine (0.05 mg/kg s.c.), however, was only slightly reduced by atropine. The results were essentially the same in the innervated and denervated parts of the stomach. Atropine thus seems to block the acetylcholine mechanism, but only in doses which are likely to be toxic to man.

44 **VALIDITY OF POLYETHYLENEGLYCOL IN THE STUDY OF THE TOTAL PANCREATIC SECRETION IN MAN AFTER STIMULATION BY SECRETIN, PANCREOZYMIN, OR FOOD.** *(E.)* Worning, H. (Blegdamshospital, Copenhagen, Denmark). *Gut* 8(6):599-604, 1967.

Polyethyleneglycol was infused intraduodenally at a constant rate as an unabsorbable marker in 33 fasting patients to determine whether intestinal flow in the intact human intestine could be used to express pancreatic amylase secretory rate after secretin, pancreozymin, or food (fluid meal of skim milk powder with corn oil and glucose dissolved in H_2O) stimulation. Duodenal contents were aspirated via a catheter positioned at the ligament of Treitz. The calculated values for intestinal flow and pancreatic enzyme secretion were in many respects incompatible with the present knowledge of pancreatic function. The mean value for calculated intestinal flow following secretin (500 ml/8 min) exceeded the volumes aspirated from the duodenum following secretin stimulation by a similar dose. The similarity between mean values for the intestinal flow and amylase secretion at 0-20 min and 20-40 min after secretin and pancreozymin stimulation contradicts the known physiological action of secretin as a specific stimulus to fluid and bicarbonate secretion, and pancreozymin as a specific stimulus to enzyme secretion. It is concluded that this technique fails to provide an accurate calculation of pancreatic enzyme secretion in any subject tested.

45 **ACID AND PEPSIN RESPONSES TO GASTRIN IN HEIDENHAIN POUCH DOGS FOLLOWING BILATERAL ADRENALECTOMY.** *(E.)* Cooke, A. R. (UCLA Sch. Med., Los Angeles, Calif.). *Gut* 8(6):588-591, 1967.

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The effects of gastrin and histamine on acid and pepsin secretion were observed in 4 adrenalectomized mongrel dogs (14-20 kg) with Heidenhain pouches. Studies were made with the adrenals intact; with the animals receiving 2.5 mg desoxycorticosterone acetate (DOCA) therapy every 2 days and daily salt supplements of 4 g following adrenalectomy; with the animals receiving DOCA and hydrocortisone every 2 days; and with steroid therapy, but not salt replacement discontinued. Gastric secretions were collected by drainage every 15 min. Gastrin-stimulated acid and pepsin outputs were not affected by adrenalectomy. Histamine-stimulated acid output, but not pepsin output decreased after adrenalectomy. Hydrocortisone increased both gastrin- and histamine-stimulated acid and pepsin secretions in adrenalectomized dogs. Gastrin-stimulated acid outputs after discontinuation of steroid therapy were similar to pre-adrenalectomy levels.

46 **INSULIN-POTASSIUM EFFECT ON GASTRIC ACID SECRETION AND ANTRAL MOTILITY IN DOGS.** *(E.)* Kemp, D. R. (Coll. Med., U. Fla., Gainesville), F. Herrera, T. Tsukamoto and M. M. Eisenberg. *Gastroenterology* 54(2):190-196, 1968.

The effect of elevated serum K^+ on insulin-inhibited acid secretion, the dependence of K^+ on parasympathetic innervation, and the effect of insulin inhibition on serum K^+ were studied in 4 dogs with gastric fistulas and 5 dogs with isolated innervated antrums. After the establishment of constant gastric output by continuous histamine infusion, 4 dogs were given insulin (1 U/kg i.v.) and 15-min gastric secretions were collected for 2.5 hr. Insulin administration inhibited gastric secretion and lowered blood sugar and serum K^+ before and after vagotomy; these effects were reversed by an i.v. load of K^+ (1.0 mEq/kg). Continuous histamine and K^+ infusion inhibited the gastric acid response to insulin, before and after vagotomy; atropinization did not change these responses. Constant infusion of 10% dextrose, to prevent blood sugar decrease, did not alter the inhibitory response to insulin. In dogs with isolated innervated antrums, insulin (0.5 U/kg i.v.) inhibited and then stimulated antral motility; this effect was not influenced by continuous infusion of K^+. Dextrose infusion markedly reduced insulin-induced motility. These studies indicate that the site of K^+ influence is at the secretory cell level and not at the vagus center or on the peripheral vagus nerve.

47 **THE CARBOHYDRATE COMPONENTS OF HYDROLYSATES OF GASTRIC SECRETION AND EXTRACTS FROM MUCOUS GLANDS OF THE GASTRIC BODY MUCOSA AND ANTRUM.** *(E.)* Schrager, J. (Roy. Albert Edward Infirmary, Wigan, England) and M. D. G. Oates. *Biochem. J.* 106(2):523-529, 1968.

Glycoproteins were studied in the fractional gastric aspirations from 20 people and in the dissected mucus-secreting glands of the body mucosa and antrum of 4 surgical specimens. The sugars and amino sugars of the hydrolyzates were determined by gas-liquid chromatography. All of the gastric aspirations showed fucose, galactose, mannose, glucose, galactosamine, glucosamine, N-acetylneuraminic acid, and sulfate. While galactose and glucosamine were always found in equimolar amounts, the galactose/galactosamine ratio in different samples was 2:1, 3:1, 4:1, or 5:1. Repeated analyses of each subject showed constant ratios of these carbohydrate components. Fucose bore an inconstant ratio of less than 1:1 to galactose; a similar relationship obtained between sialic acid and galactosamine. Glucose, mannose and the other carbohydrate components showed no definite interrelationships. Extracts from the mucus glands of the body mucosa and antrum showed the same carbohydrate components as those in gastric secretion.

48 **EFFECT OF ACID IN PROXIMAL AND DISTAL DUODENAL POUCHES ON GASTRIC SECRETORY RESPONSES TO GASTRIN AND HISTAMINE.** *(E.)* Andersson, S. (Dept. Pharmacol., Karolinska Inst., Stockholm, Sweden), G. Nilsson and B. Uvnäs. *Acta Physiol. Scand.* 71(4): 368-378, 1967.

Nine dogs were prepared with Pavlov pouches (Thomas' modification) and 8 with Heidenhain pouches. Then all 9 Pavlov dogs and 6 Heidenhain dogs underwent a 2-stage operation transecting the duodenum just proximal to the common bile duct entrance. A cutaneous fistula was created by anastomosis with a loop of terminal ileum. In 2 of the Pavlov dogs and the remaining 2 Heidenhain dogs, distal duodenal pouches were created just distal to the main pancreatic duct entrance and exteriorized. Perfusion of the proximal (bulbar) pouch with 0.1 N hydrochloric acid markedly inhibited the secretory response to gastrin in both Pavlov and Heidenhain dogs. The secretory response to gastrin was not significantly inhibited by acid perfusion of the distal duodenal segment. Secretory responses to histamine were not significantly inhibited by bulbar acidification. It thus appears that the pH-sensitive inhibitory mechanism of the duodenum is located chiefly in the duodenal bulb.

49 **DISPARATE POUCH AND MAIN STOMACH SECRETIONS: POSSIBLE EFFECT OF ANTRAL AND DUODENAL INHIBITION.** *(E.)* Griffen, W. O., Jr. (U. Kentucky Med. Ctr., Lexington), H. D. Root, E. Yonehiro and J. F. Perry, Jr. *Amer. J. Dig. Dis.* 12(11):1135-1139, 1967.

Eight-hour collections of gastric juice from the innervated fundic pouch of 4 dogs after meat stimulation were compared after a series of three gastric resections. The second stage was segmental gastric resection and Heineke-Mikulicz pyloroplasty; stage three involved denervation of the pouch while stage four consisted of the denervation of the main stomach. In 3 of the 4 dogs, reduction by 60% of the parietal cell mass of the main stomach (Stage II) resulted in a significant increase in gastric juice output while acid output was also increased. Vagal denervation of the remaining stomach increased secretion in the denervated pouch. It is suggested that these findings may be due to reduced antral and duodenal inhibition rather than to the effects of vagotomy alone.

50 **INHIBITION OF SALIVARY SECRETION AND SECRETORY POTENTIALS BY g-STROPHANTHIN, DINITROPHENOL AND CYANIDE.** *(E.)* Petersen, O. H. (Inst. Med. Physiol. A, U. Copenhagen, Denmark) and J. H. Poulsen. *Acta Physiol. Scand.* 71(2/3):194-202, 1967.

In young cats under chloralose anesthesia, the submandibular glands were perfused with Locke's solution and microelectrodes were implanted to record the secretory potentials (hyperpolarization of the contraluminal acinar cell membrane) following stimulation of the gland, either electrically or by the intra-arterial injection of epinephrine (1 μg) or acetylcholine (5 μg). The results showed that both salivary secretion and the secretory potentials were completely inhibited within 5-10 min by addition of g-strophanthin (ouabain, 10^{-4}M), 2,4-dinitrophenol (10^{-4}M) or sodium cyanide (2 x 10^{-3}M) to the perfusing solution. The parallel response of the salivary secretion and the secretory potentials supports the hypothesis that the secretory potential is due to an active electrogenic chloride transport, rather than to a change in membrane permeability.

51 **HISTAMINE IN THE GASTRIC HYPERSECRETION FOLLOWING BILIARY OBSTRUCTION IN DOGS.** *(E.)* Goksen, Y. (U. Mississippi Med. Ctr., Jackson) and J. D. Hardy. *Arch. Surg.* 96(1):104-108, Jan. 1968.

In 7 of 8 dogs with Heidenhain pouches and spleens which had been partially explanted into the subcutaneous tissue, ligation of the common bile duct proximal to its entry into the duodenum was followed by an average 57% increase in the 24-hr volume of gastric secretion and by an average 93% increase in the secretion of free acid. However, significant increases in the 6-hr postcibal secretion of free acid were observed in only 3 of 7 animals. The one dog showing no change in secretion developed portal hypertension and ascites. The basal secretion of free acid continued to increase for 4 weeks, but the secretion of free acid in response to histamine (0.04 mg/kg/hr i.v. via the explanted spleen) did not increase significantly until the 5th week, and then in only 4 of 6 survivors. The same 4 dogs showed the highest serum bilirubin levels and the most severe changes in hepatic morphology. The results indicate that failure of damaged liver cells to inactivate histamine cannot be the major cause of the increased gastric secretion observed after ligation of the common bile duct. The possibility remains that an active secretory principle is derived from the damaged liver itself.

52 **A COMPARISON OF THE STANDARD AND "MAXIMAL" SECRETIN TEST FINDINGS IN NORMAL SUBJECTS.** *(E.)* Bordalo, O. (Fac. Med. Santa Maria U. Hosp., Lisbon, Portugal) and M. S. Teixeira. *Amer. J. Gastroent.* 48(4):328-333, 1967.

53 **THE PRESENCE OF DOPAMINE IN HUMAN GASTRIC JUICE.** *(E.)* Häggendal, E. (U. Göteborg, Sweden). *Acta Physiol. Scand.* 71(1):127-128, 1967.

54 **REDUCTION OF ANTRAL AND DUODENAL GASTRIN ACTIVITY BY ELECTRICAL VAGAL STIMULATION.** *(E.)* Fyro, B. (Karolinska Inst., Stockholm, Sweden). *Acta Physiol. Scand.* 71(4):334-340, 1967.

55 **CHANGES OF THE pH OF SALIVA AFTER ADDITION OF SEVERAL KINDS OF GLYCIDE DIETS.** *(Cz.)* Sazama, L. and J. Jicha. *Cesk. Stomat.* 65(6): 443-452, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

56 **THE BIOCHEMISTRY OF GASTRIC ACID SECRETION.** *(E.)* Davies, R. E. Pp. 37-43 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson (Eds.) New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

57 **INHIBITION OF GASTRIC SECRETION BY PROSTAGLANDINS.** *(E.)* Robert, A. (Upjohn Co., Kalamazoo, Mich.), J. E. Nezamis and J. P. Phillips. *Amer. J. Digest. Dis.* 12(10):1073-1076, 1967.

58 **STOOL CHYMOTRYPSIN AND TRYPSIN DETERMINATIONS.** *(E.)* Adham, N. F. (U. So. Calif. Sch. Med., Los Angeles), B. J. Dyce, M. C. Geokas and B. J. Haverback. *Amer. J. Digest. Dis.* 12(12):1272-1276, 1967.

59 **ON THE EFFECT OF INSULIN ON THE STIMULATED SECRETION IN THE VAGALLY INNERVATED AND DENERVATED GASTRIC SEGMENT.** *(Ger.)* Lick, R. F. (Surgical Polyclinic, U. Munich, Germany), R. Endriss, W. Hart, D. Balser and R. Riffelmacher. *Int. Z. Klin. Pharm., Ther., Toxic.* 1(3):209-219, 1968.

60 **STUDY OF HYDROCHLORIC ACID SECRETION WITH MAXIMUM HISTAMINE DOSE AS RELATED TO THE MASS OF PARIETAL CELLS IN THE STOMACH OF THE RAT.** *(Sp.)* Ochoa, V. R. *Rev. Esp. Enferm. Apar. Dig.* 26(8):945-964, 1967.

61 **INTERACTION BETWEEN MORPHOLOGICAL CHANGES IN GASTRIC MUCOSA AND ITS SECRETORY FUNCTION IN VARIOUS AGE GROUPS.** *(Uk.)* Persydskyi, V. Ya. (A. A. Bogomoletz Kiev Med. Inst., USSR). *Fiziol. Zh. (Kiev)* 14(1):94-100, 1968.

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DIGESTION

62 **INTRADUODENAL HYDROLYSIS OF GELATIN AS A MEASURE OF PROTEIN DIGESTION IN NORMAL SUBJECTS AND IN PATIENTS WITH MALABSORPTION SYNDROMES.** *(E.)* Cerda, J. J. (Philadelphia Gen. Hosp., Pa.), F. P. Brooks and D. J. Prockop. *Gastroenterology* 54(3):358-365, 1968.

Protein-bound, peptide-bound, and free hydroxyproline were measured in duodenal aspirates obtained from 5 normal subjects, 7 pancreatic insufficiency patients, and 4 adult celiac disease patients after intragastric infusions of a gelatin solution (25 g gelatin, 9 g NaCl, and 50 mg phenol red in 1 liter H_2O). All subjects received gelatin-free diets for 2 days prior to experiment and were fasted overnight and until the end of the test solution administration. Hydroxyproline was determined by the Kivirriko-modified method of Prockop and Udenfriend. Duodenal aspirates were collected by a tube located 25 cm from the end of the infusion tube. In all normal subjects, 63-84% of hydroxyproline in the test solution was digested to dialyzable peptides. Pancreatic insufficiency patients showed a marked defect in gelatin hydrolysis; 15% of the infused gelatin was converted to dialyzable peptides. Adult celiac disease patients demonstrated a 35-48% hydroxyproline conversion, indicating a partial digestion defect. Although this method offers a precise measure of protein digestion in these conditions, its value as a routine procedure for evaluating malabsorption syndromes is questionable.

63 **METABOLISM OF LYSOLECITHIN BY RAT SMALL INTESTINE.** *(E.)* Saunders, D. R. (Dept. Med., U. Washington, Seattle), C. M. Parmentier and P. O. Ways. *Gastroenterology* 54(3):382-391, 1968.

Thoracic duct fistulas and duodenostomies were established in anesthetized male Sprague-Dawley rats weighing 250-300 g to study the metabolism of luminal lysolecithin to chylomicron lecithin. Chromatographically purified ^{14}C-lysolecithin or ^3H-lysolecithin was intraduodenally infused into the animals 24 hr after surgery. ^{14}C-lysolecithin was almost completely absorbed during the 24 hr following its infusion; less than 3% was recovered in the gastrointestinal tract and feces. Lymph lecithin and neutral lipids contained 30-53% of ^{14}C administered; the radioactivity percentage was higher in the fatty acid portion than in the glycerol portion of the labeled phospholipid. Lysolecithin comprised 87.4% of the total phosphorus in the jejunal content of a normal human subject 30 min after intraduodenal corn oil infusion; lecithin was the predominant luminal phospholipid in similar rat experiments. In 2 rats, radioactivity was found in lecithin, triglycerides, free fatty acids, and water-soluble compounds extracted from the luminal contents 30 min after intraduodenal ^3H-lysolecithin infusion. Labeled water-soluble metabolites were found in portal venous blood. Radioactive lymph lecithin was associated with chylomicrons and very low density lipoproteins; radioactivity incorporation into lymph lecithin was enhanced by increasing the amount of triolein in the intraduodenal infusion. Luminal lysolecithin and its metabolites may be lymph lecithin precursors during dietary triglyceride absorption.

64 **DETERMINING THE PEPTIC ACTIVITY OF THE GASTRIC JUICE BY MEANS OF RADIOIODINE-LABELED SERUM ALBUMIN.** *(Fr.)* Quoidbach, A. (Canton Hosp., Geneva, Switzerland), B. Eggi and R. Busset. *Gastroenterologia* 108(5):275-282, 1967.

The proteolytic activity of human gastric juice and of known concentrations of commercial pepsin was determined by the method of Klotz and Duvall in which radioiodinated human serum albumin, diluted with bovine albumin, is used as the substrate and the enzymatic activity is estimated from the radioactivity remaining in the supernatant after removal of the protein with 50% trichloroacetic acid. The effects of pH and of the concentrations of enzyme and substrate were investigated, and the method was found to be highly sensitive and reliable with a coefficient of variation of 2.8%.

65 **INTESTINAL DISACCHARIDASES AND DISACCHARIDE INTOLERANCE.** *(E.)* Dahlqvist, A. ((U. Lund, Sweden). *Bull. Soc. Chim. Biol.* 49(12):1635-1646, 1967.

66 **EFFECTS OF PROSTAGLANDIN E_1 ON LIPOLYSIS AND PLASMA FREE FATTY ACIDS IN THE FASTED RAT.** *(E.)* Kupiecki, F. P. (Upjohn Co., Kalamazoo, Mich.). *J. Lipid Res.* 8(6):577-580, 1967.

67 **EFFECT OF BILE SALT ON DIGESTIVE ENZYMES OF RAT PANCREATIC JUICE.** *(E.)* (George Washington U. Sch. Med., Washington, D. C.) and A. S. Brecher. *Arch. Biochem.* 123(2):247-254, 1968.

See also abstract no.: 11

MOTILITY

68 PENTAZOCINE EFFECTS ON GASTROINTESTINAL MOTOR FUNCTIONS IN MAN. *(E.)*

Danoff, I. E. (U. Texas Southwestern Med. Sch., Dallas, Tex.). *Amer. J. Gastroent.* 48(4):295-310, 1967.

The effect on gastrointestinal motor function of 15, 30 and 40 mg of i.v. pentazocine was studied in 14 healthy, fasting males aged 20-45. Indices studied were gallbladder response to1 U/kg intramuscular cholecystokinin; the volume, flow rate, acidity and bilirubin content of four 20-min duodenal aspirates; bile microscopy; and serum amylase levels. Pentazocine did not impair gallbladder motor function, even at the higher dosages, in 3 out of 4 subjects. The reduced bile volume and bilirubin content in 1 subject was attributed to pentazocine-induced spasm in Oddi's sphincter. Serum amylase levels rose following 40 mg of pentazocine in 2 out of 5 subjects; no elevation was observed with 30 and 40 mg doses in the remaining subjects. Pentazocine delayed gastric emptying at all dose levels. One subject showed normal gastric emptying with 15 mg (0.13 mg/kg) and reduced gastric emptying with 40 mg (0.35 gm/kg). Small intestinal motility showed a dose response trend, delay appearing at doses exceeding 0.30 mg/kg. Total gastrointestinal transit (oxygen transit time) in all 9 subjects receiving 30 and 40 mg doses was significantly reduced. Colonic motility depression was moderate in 5 subjects receiving 0.44-0.56 mg/kg and occurred only when the dose exceeded 0.50 mg/kg. He Hematograms and urinalyses showed no abnormalities. Side-effects (nasal pruritis, auditory hyperacuity, nausea, disequilibrium, muscular weakness) caused discomfort but had no clinical significance. Pentazocine is proposed for therapeutic use in acid-peptic ulcerative disease (in combination with a strong buffering antacid), dumping syndrome, obesity (to extend satiety by promoting gastric retention), and gastrointestinal hypermotility. The larger doses required in the latter condition would be of limited usefulness due to side-effects.

69 INHIBITORY EFFECT OF ANGIOTENSIN ON THE INTESTINAL MOTILITY OF THE CAT AND ITS RELATION TO SYMPATHETIC NERVOUS SYSTEM.

(E.) Turker, R. K. (Ankara U., Ankara, Turkey) and S. O. Kayaalp. *Arch. Int. Physiol.* 75(5):735-744, 1967.

Phenobarbital-anesthetized (30 mg/kg i.v.) mongrel cats (48 animals) weighing 2-4 kg underwent tracheal and femoral cannulation. A mercury manometer was connected to the carotid artery to monitor blood pressure. A 20-30-cm ileal loop was exposed and a 10-15 ml water-filled balloon, connected to a volume recorder, was inserted into it. Total adrenalectomy was done on 8 cats; in 3 adrenalectomized and 3 intact cats, catheters were inserted into a small branch of the mesenteric artery supplying the exposed ileal loop. Angiotensin (0.5-1 μg/kg i.v.) caused inhibition of intestinal motility in most animals. In 4 animals there was an initial contraction followed by a delayed inhibition, which failed to occur at doses below 100 ng/kg. DMPP (Dimethyl-4-phenyl piperizinium) in a 30 μg/kg dose produced a transient contraction and a secondary delayed inhibition of motility. DMPP inhibition duration was almost equal to that of 1 μg/kg angiotensin. Hexamethonium (10-15 mg/kg) blocked DMPP inhibition but not angiotensin inhibition in intact cats. Morphine (10-20 μg/kg) shortened but did not completely block motility inhibition in both intact and adrenalectomized animals. Intra-arterial angiotensin produced transient contraction following delayed inhibition of motility with occasional blood pressure increase in both groups of animals.

Intravenous hemicholinium-3 (2 mg/kg) did not affect the action of angiotensin given intravenously or intra-arterially. Dihydroergobamine (2 mg/kg) produced a stronger contractile angiotensin response in normal animals than in hexamonium- or hemicholinium-3-treated animals. Intravenous atropine (0.5 μg/kg) partially blocked this response. The authors conclude that angiotensin inhibition of intestinal motility in the anesthetized cat is probably mediated by catecholamine release from postganglionic sympathetic nerve endings.

70 EFFECTS OF SOME AUTONOMIC DRUGS ON CIRCULAR ESOPHAGEAL SMOOTH MUSCLE.

(E.) Christensen, J. (U. Iowa Hosp., Iowa City) and E. E. Daniel. *J. Pharmacol. Exp. Ther.* 159(2):243-249, 1968.

Strips from the lowest centimeter of the cat esophagus were mounted to record tension and electrical activity in the circular muscle. There were no spontaneous contractions, and slow waves and spike bursts occurred only during drug-induced activity. Cholinergic drugs produced contractions; the maximal responses to methacholine and carbachol were greater than those due to acetylcholine. Contractions due to norepinephrine were opposed by tolazoline but not by propranolol. Contractions due to all 4 drugs were opposed by atropine but not by nicotine or hexamethonium. Responses to the 4 stimulating drugs declined slowly with time; there was no tachyphylaxis. Isoproterenol had no stimulating effect but depressed the contractile responses to cholinergic drugs in a dose-related fashion. This effect was opposed by propranolol. Isoproterenol also depressed the contractions due to norepinephrine and epinephrine in the presence of tolazoline. These results indicate that adrenergic alpha receptors in this tissue are excitatory while beta receptors are inhibitory. Thus, relaxation of the lower esophageal sphincter, if mediated through adrenergic nerves, is a response to the stimulation of adrenergic beta receptors.

71 AN EXPERIMENTAL METHOD FOR RECORDING THE BEHAVIOR OF HUMAN ISOLATED COLONIC SEGMENTS.

(E.) Bucknell, A. (King's Coll. Hosp. Med. Sch., Denmark Hill, London, England) and C. Clark. *Gut* 8(6):569-573, 1967.

Isolated human colon segments, removed at operation and maintained viable by vascular and lumen perfusion with oxygenated Krebs' solution, were used in an apparatus so designed that muscular activity, intraluminal pressure and lumen outflow could be recorded. Specimens exhibited spontaneous rhythmic muscle activity for a period of 6-8 hr. Intraluminal pressure waves appeared which were similar in amplitude and frequency to those due to segmental colon activity *in situ.*

72 DIFFERENTIAL RESPONSE TO VARIOUS STIMULANTS IN THE BODY AND ANTRUM OF THE CANINE STOMACH.

(E.) Anderson, J. J. (U. Michigan Med. Ctr., Ann Arbor), R. J. Bolt, B. M. Ullman and P. Bass. *Amer. J. Dig. Dis.* 13(2):147-156, 1968.

Longitudinal and circular muscle contractility in the gastric body and antrum of 5 beagles was monitored with implanted extraluminal transducers during the interdigestive state and after stimulation with horse meat (200 g), i.v. acetylcholine (50 or 200 µg/kg/min for 30 min) or 5-hydroxytryptophan (5-HTP) (600 µg/kg/min for 30 min). Duncan multiple range analysis showed stimulation with food and 5-HTP significantly increased contraction frequency, while neither dose of acetylcholine significantly altered contraction frequency. Acetylcholine stimulation occurred only during the first 6-10 min of infusion. Contraction amplitude was significantly increased by 5-HTP and unchanged by the higher dose of acetylcholine; food and the lower dose of acetylcholine significantly decreased contraction amplitude. The transducer method is useful for quantitative assay of gastric activity.

73 **EFFECT OF BILE AND FAT ON GASTRIC MOTILITY UNDER THE INFLUENCE OF VARIOUS STIMULANTS.** *(E.)* Anderson, J. J. (U. Michigan Med. Ctr., Ann Arbor), R. J. Bolt, B. M. Ullman and P. Bass. *Amer. J. Dig. Dis.* 12(2):157-167, 1968.

In beagles, saline solution, dog bile, or micellar fat in bile and saline were placed in a Thiry loop of duodenum 1-3 min before gastric stimulation with horse meat (200 g), i.v. acetylcholine (50 or 200 µg/kg/min for 30 min), or i.v. 5-hydroxytryptophan (5-HTP) (600 µg/kg/min for 30 min). Longitudinal and circular muscle contractility of the gastric body and antrum was studied using extraluminal transducers. Analysis by Jacoby and Brodie's motility index showed no change in contraction frequency attributable to either bile or micellar fat, and no decrease in contraction amplitude attributable to gastric stimulation. Micellar fat did tend to decrease the frequency and amplitude of contractions induced by 5-HTP or the lower dose of acetylcholine, but the tendency was not statistically significant. The Thiry loop may not have provided sufficient surface for effective inhibition by fat.

74 **RECORDING OF INTESTINAL MOTILITY: ROUTINE OR RESEARCH?** *(E.)* Connell, A. M. *Gut* 8(6):527-529, 1967.

A discussion is presented on the relative merits and shortcomings of the use of radiology and manometry in the study of intestinal motility. These methods offer only circumstantial evidence about events occurring in the muscle itself. Manometric procedures have found clinical application only in the esophagus and colon. Applications have added to our knowledge of esophageal motor activity, the nature of chest pain, the occurrence of peristaltic contractions, esophageal peristalsis, and the significance of the sphincters. Manometry may also reveal physiological disorders such as hiatus hernia, reflux, and diffuse spasm. The varying diameter of the colon lumen and the presence of a pultaceous content make interpretation of pressure records more hazardous, but motility studies can be used as guides to high or low pressure bowel dysfunction. Pressure studies have been useful in outlining abnormal colonic mechanisms in diverticular disease and irritable bowel syndrome. While pressure studies continue to contribute to our understanding of the mechanisms of the alimentary tract disorders, clinical indications for intraluminal pressure studies are narrowly defined and further advances will be made only when data can be obtained directly from the muscle itself.

75 **EXTRALUMINAL CONTRACTILE FORCE AND ELECTRICAL ACTIVITY OF REVERSED CANINE DUODENUM.** *(E.)* Ludwick, J. R. (U. Michigan Med. Ctr., Ann Arbor), J. N. Wiley and P. Bass. *Gastroenterology* 54(1):41-51, 1968.

Extracellular electrodes and extraluminal contractile force strain gauge transducers were used in studying the contractile and electrical activity of the duodenum in 6 beagle dogs. After studies were completed in 3 intact dogs, the duodenum was divided and double anastomosis was effected to give a nonreversed segment 10-12 cm in length. After recovery, duodenal contractile frequencies were recorded before and after eating. The other 3 dogs were subjected to a 10-12 cm duodenal segment reversal and double anastomosis. The effects of morphine, methacholine, and 5-hydroxytryptophan on contractility were also tested. Contractile frequency and electrical rhythm in segments below an anastomosis fell from 18 to 14 cycles per min. The reversed segment failed to develop a digestive contractile pattern to either food or 5-hydroxytryptophan. The contractile force of the original caudal end was markedly increased after reversal. Peristaltic polarity was maintained in the reversed segment. Emptying of the intestine cephalad to a reversed duodenal segment is slowed by cephalad contractions in the transposed loop and by increased contractile forces developed by the original caudal end of the reversed segment.

76 **A STUDY OF THE EFFECT OF CERTAIN DRUGS ON THE SPHINCTER OF ODDI IN MAN.** *(Fr.)* Stalport, J. (35 Chaussée de Liège, Huy, Belgium). *Acta Gastroent. Belg.* 30(8-9):599-607, 1967.

During a number of operations for cholelithiasis, bile flow through the sphincter of Oddi was monitored while perfusing the common bile duct with normal saline at a pressure slightly above the residual pressure. The observed variations in flow are ascribed to dilation and constriction of the sphincter due to drugs and nervous stimuli (making allowance for respiration and duodenal movements). Under these conditions succinylcholine (50 mg i.v.) had a consistent dilating effect on the sphincter of Oddi. Trentadil [1-H-4,5,6,7-tetrahydro-2-benzyl-1-[N-ethyl-N-(β-hydroxyethyl)-2-aminoethyl]-4,6-dimethyl-5,7-dioxoimidazo[4,5-d]-pyrimidine hydrochloride] had a dilating effect in 10 of 12 cases at 600 mg i.v., but in only 5 of 12 cases at 300 mg i.v.; dilation of the sphincter was also produced (in 10 of 13 and 11 of 12 cases, resp.) by i.v. injections of C-9237 (Dimorin, a derivative of 2-benzylimidazo[4,5-d]pyrimidine, at 500 mg) or Primperan (metoclopramide at 10 mg). Novalgine (sodium phenyldimethylprazolone methylaminomethylsulfonate at 2.5 g i.v.) constricted the sphincter in 7 of 10 cases, an effect which was overcome only by 600 mg of Trentadil when the two drugs were given together. Finally, intraduodenal administration of 20 cc of 2% procaine had a variable effect, constricting the sphincter in 7 cases and dilating it in 6 cases.

77 **DETERMINATION OF TRANSIT TIME IN THE HUMAN JEJUNUM BY THE SINGLE-INJECTION INDICATOR-DILUTION TECHNIC.** *(E.)* Barreiro, M. A. (McGill U. Clinic, Montreal, Canada), R. D. McKenna and I. T. Beck. *Amer. J. Dig. Dis.* 13(3):222-233, 1968.

MOTILITY

Presented was a method to assess the propulsion speed of gastrointestinal contents. Using single injections of radio-Renografin-^{125}I (R-^{125}I) and phenolsulfonphthalein (PSP) as markers, the transit time was determined in a 25 cm jejunal segment *in vivo* in 15 healthy subjects. A multilumen catheter was used for sequential sampling orad and caudad to the injection point and the shape acquired by the bolus was determined from the derived dilution curve. A comparison of values obtained with polyethylene glycol (molecular weight 4000) and R-^{125}I showed the nonabsorbability of R-^{125}I. The interchangeability of PSP and R^{125}I was shown by injection of 2 ml of PSP (5 g/100 ml) and R-^{125}I (50 μC/100 ml) through the same catheter during 11 transit time determinations in 5 subjects. Both markers mixed satisfactorily with jejunum contents. The time-concentration curves of both markers were parallel. The highest concentration of marker recorded at the sampling site (peak concentration time) was proposed as a more representative and practical value of the transit time than the mean transit time.

78 **ELECTROMYOGRAPHIC STUDIES ON CANINE ESOPHAGEAL MOTILITY.** *(E.)* Hellemans, J. (U. Hosp., St. Rafaël, Louvain, Belgium) and G. Vantrappen. *Amer. J. Dig. Dis.* 12(12):1240-1255, 1967.

The electrical activity of the esophagus which accompanies deglutition was studied in 10 unanesthetized dogs 2 days to 4 weeks after surgical implantation of bipolar platinum electrodes at 4 different levels of the lower esophagus. Deglutition results in a spike burst in the esophagus proper which is similar to the electromyographic recording of skeletal muscle contraction of progressively increasing and decreasing strength. Similar electrical activity was found in the supradiaphragmatic part of the gastroesophageal sphincter except that the maximal amplitude of spikes is lower and frequency of spiking is decreased. Absence of electrical activity in the infradiaphragmatic portion of the sphincter correlates with the manometric observation of relaxation of this portion of the sphincter in response to swallowing. An electrical equivalent of the high resting pressure in the gastroesophageal sphincter could not be demonstrated by this technique.

79 **THE ELECTROPHYSIOLOGICAL BASES OF GASTROINTESTINAL MOTILITY.** *(Fr.)* Hellemans, J. (Acad. Hosp., St. Rafaël, Belgium), G. Vantrappen and J. Vandenbroucke. *Acta Gastroent. Belg.* 30(10):635-645, 1967.

By way of introduction to a symposium on the clinical aspects of gastrointestinal motility, a review is presented of the electrical phenomena in the esophagus, stomach, small intestine and and colon as revealed by the technique of electromyography. The differences between transmembrane resting potentials, the slow waves or basal variations in electrical potential, and the action potentials or spikes are pointed out, and typical tracings are presented from the various organs of the digestive tract. Very little information is available on the colon, but in all other parts of the gastrointestinal tract, peristaltic contractions seem to be accompanied by two types of electrical activity: slow waves and spikes. In the small intestine, these slow waves originate only in the longitudinal muscle fibers. The role and distribution of electrical pacemakers in the digestive tract are also discussed.

80 **BRADYKININ AND MOTILITY OF THE INTESTINAL VILLI.** *(E.)* Ludany, G. (Med. U., Budapest, Hungary), M. Ihasz and J. Karika. *Med. Pharmacol. Exp.* 17(4):311-314, 1967.

81 **THE GASTROCOLONIC REFLEX.** *(Sp.)* Freytes, M. A. (Natl. U., Córdoba, Argentina) and L. M. Amuchastegui. *Rev. Esp. Enferm. Apar. Dig.* 26(10): 1214-1220, 1967.

See also abstract nos.: 2,7,8,46

HEPATIC METABOLISM

2 **THE IRON CONTENT OF SUBCELLULAR FRACTION OF THE LIVER. I. EXPERIMENTS ON HEALTHY RATS.** *(Pol.)* Kaszewska-Jablonska, I. (1st Intern. Dis. Clin. Gdansk, Poland). *Pol. Arch. Med. Wewn.* 39(6):733-739, 1967.

Biochemical studies of the liver in 43 adult rats revealed a significantly higher total iron content and iron/protein ratio in females than in males. Distribution of iron among the various subcellular fractions was the same in both sexes, with about 67% of the iron being found in the cytoplasmic fraction, 20% in the nuclear fraction, and 8% each in the mitochondrial and microsomal fractions. Because of possible anomalies in liver protein metabolism, it is more useful to calculate the iron content in micrograms per gram of tissue than to calculate the iron/protein ratio.

83 **ADAPTIVE BEHAVIOUR OF SOME ENZYMES INVOLVED IN GLUCOSE UTILIZATION AND FORMATION IN RAT LIVER DURING THE WEANING PERIOD.** *(E.)* Vernon, R. G. (Dept. Biochem., U. Birmingham, England) and D. G. Walker. *Biochem. J.* 106(2):331-338, 1968.

A study was made in prematurely and normally weaned rats of the effect of dietary changes on the activities of the hepatic enzymes involved in both the utilization of glucose and the formation of glucose by gluconeogenesis. Weaning to high-glucose diets generally increased activity of the enzymes involved in glucose utilization and more rapidly decreased activity of the gluconeogenic enzymes toward normal adult values. Weaning to high-fat and high-protein diets generally slowed the activity increase of the enzymes involved in glucose utilization, and prevented the gluconeogenic enzyme activity decrease that occurs during normal weaning.

84 **THE *IN VITRO* CATABOLISM OF HISTAMINE BY SHEEP LIVER TISSUE.** *(E.)* Sjaastad, O. V. (Vet. Coll. Norway, Oslo). *Acta Physiol. Scand.* 71(1):6-15, 1967.

At optimal substrate concentrations in the presence of 0.2% glucose, sheep liver slices incubated in pH 7.4 Ringer phosphate buffer at 37C with a gas phase of 95% O_2 - 5% CO_2 inactivated 178.5 ± 57.4 μg of histamine diphosphate per gram wet weight of tissue per hr; this would correspond to a reserve capacity of about 180 mg/hr for a liver weighing 1 kg. There was no significant difference between liver slices and homogenates. Histamine inactivation was strongly inhibited by aminoguanidine, a powerful inhibitor of diamine-oxidase, indicating that oxidative deamination is the major pathway for inactivation of histamine in sheep liver tissue *in vitro*. Addition of iproniazid, p-hydroxymercuribenzoate or S-adenosylmethionine to aminoguanidine-inhibited preparations had no effect on residual histamine inactivation, indicating that monoamineoxidase and methylation play little or no role under these conditions. About 1% of added histamine was inactivated by conjugation, and about 2% was inactivated by unknown mechanisms which may be nonenzymatic. The average content of preformed histamine in sheep liver was 24.7 ± 11.1 μg of histamine diphosphate per gram of wet weight.

85 **AN EXPERIMENTAL STUDY OF BLOOD AMMONIA LEVELS IN VARIOUS REGIONS OF THE CIRCULATION. REPORT 1.** *(It.)* Marinaccio, G. (Inst. Spec. Surg. Path., U. Bari, Italy), S. Ferrarese, V. Ronzini, V. Disanto and A. Furino. *Riv. Gastroent.* 19(2):83-86, 1967.

Determinations of the blood ammonia levels in 10 adult, healthy dogs revealed the highest concentrations in the caudal mesenteric, cranial mesenteric, renal and portal veins (0.46-0.73 μg/ml in the fasted animal and 0.95-2.97 μg/ml in animals on a meat diet). The lowest values were obtained in the aorta and peripheral circulation (0.12-0.18 μg/ml fasting and 0.24-0.42 μg/ml on a meat diet), while intermediate values were obtained in the splenic vein, the left gastric vein, the suprahepatic vein and the vena cava. The increase on a meat diet was most marked in the caudal and cranial mesenteric veins, confirming the efficiency of the liver in rapidly neutralizing the ammonia with which it comes in contact.

86 **THE EFFECT OF BETA-RECEPTOR BLOCKING AGENTS ON BILIARY FLOW.** *(Ger.)* Jacobi, H. (Sanol Pharmaceuticals Dr. Schwarz Inc., Monheim, Germany) and R. Fontaine. *Z. Gastroent.* 5(6):386-393, 1967.

In experiments on adult male Wistar rats anesthetized with urethan (2.0 g/kg s.c.), intraduodenal application of 4 different β-adrenergic blocking agents in doses of 6.25-100 mg/kg, as well as of dehydrocholic acid or bovine bile salts, produced a consistent 2% to 100% increase in biliary flow in the choledochus. Except for propranolol, all the agents studied produced linear dose-response curves with various slopes; the steepest was that of 1-(6'-chloro-3'-methylphenoxy)-3-tert.-butylaminopropan-2-ol HCl (KL-255) and bovine bile salts, followed by the curves for dehydrocholic acid and 1-(3'-methylphenoxy)-3-isopropylaminopropan-2-ol HCl (Ko-592), and finally by the curve for pronethalol. ED_{50} did not differ significantly for KL-255, dehydrocholic acid, and pronethalol, and Ko-592 was only slightly less potent. However, duration of action was longer for the drugs than for the bile acids, and there were significant differences in the effect on the content of dry matter in the bile. This was increased by KL-255 and Ko-592, was unchanged by bile salts, and was decreased by propranolol and pronethalol, showing the apparent choleretic effect of the latter two drugs to be due to dilution with water. It is concluded that the receptor specificity of the various β-adrenergic blocking agents must differ from organ to organ.

87 **LIVER TRANSPLANTATION IN DOGS: EXPERIMENTAL STUDY.** *(Por.)* Machado, M. C. C. (Fac. Med. U. São Paulo, Brazil), E. L. Goncalves, R. G. Bevilacqua, J. E. Monteiro da Cunha, J. C. Cunha, O. C. Filho, Y. Goncalez, C. C. Musatti, J. Dieffer, E. Da Silva Bastos and A. C. Netto. *Rev. Hosp. Clin.* 22(5):357-363, 1967.

Thirty adult mongrel dogs underwent heterotopic liver homotransplantation. The surgical procedure is outlined and evidence pertaining to the effects of hepatectomy and liver perfusion is detailed. Initially postoperative survival (1-25 days) was 43%; this rose to 66% with further refinement of the technique.

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88 **THE 6-HYDROXYLATION OF TRYPTAMINE BY MICROSOMAL PREPARATIONS FROM HUMAN LIVER TISSUE OBTAINED AT ROUTINE AUTOPSY.** *(E.)* Jaccarini, A. (Middlesex Hosp. Med. Sch., London, England) and J. B. Jepson. *Experientia* 24(1):29, 1968.

Liver microsomal hydroxylation was studied in postmortem liver specimens from 6 subjects. Oxidative enzymes associated with drug and foreign body metabolism were assayed in liver homogenates separated by ultracentrifugation; microsomal fractions were incubated with 10 μmoles of substrate (tryptamine, N,N-dimethyltryptamine, or N-acetyltryptophan), 0.5 μmoles NADP, 1 μmole ATP, and 10 μmoles each of nicotinamide, glucose-6-phosphate, and magnesium chloride, in 0.2 M pyrophosphate buffer at pH 7.2 at 37C for 1 hr. Human liver preparations weakly catalyzed 6-hydroxylation of N-acetyltryptophan. The preparation from 1 patient who had died from a barbiturate overdose caused considerable hydroxylation of N-acetyltryptophan. The late appearance of drug oxidases in the newborn and young account for the absence of low activity or low conversion rates in the preparations from the 2 younger subjects (aged 1 and 15 yr). The use of postmortem human liver for *in vitro* investigation of other microsomal reactions which "detoxicate" drugs is now possible.

89 **INACTIVATION OF 5-HYDROXYTRYPTAMINE (SEROTONIN) BY THE RAT LIVER: PRELIMINARY REPORT.** *(E.)* Heikkinen, E. S. (U. Oulu Dept. Pharmacol., Finland), T. K. I. Larmi and N. T. Kärki. *Acta Chir. Scand.* 133(6):475-477, 1967.

Spectrophotofluorimetric determinations of the serotonin concentration in the portal and hepatic veins and the vena cava of anesthetized rats during infusion of serotonin (10-80 μg/min into the portal circulation) showed serotonin concentration to be consistently about 0.1 μg/ml higher in the portal vein than in the hepatic vein, even before infusion. Increased serotonin concentration in the hepatic vein or vena cava occurred only at the highest infusion rate, indicating that serotonin was completely inactivated by the liver at rates up to 40 μg/min. This was confirmed by studies of blood pressure, which dropped initially at low infusion rates but rose immediately at 80 μg/min in 8 of 10 rats (the same 8 which showed an increase in the serotonin concentration in the systemic circulation). These results indicate that serotonin production by a gastrointestinal carcinoid tumor has to be very high before a carcinoid syndrome can be produced.

90 **A COMPARISON OF SODIUM EXCRETION FOLLOWING THE INFUSION OF SALINE INTO SYSTEMIC AND PORTAL VEINS IN THE DOG: EVIDENCE FOR A HEPATIC ROLE IN THE CONTROL OF SODIUM EXCRETION.** *(E.)* Daly, J. J. (Royal Hosp., Sheffield, England), J. W. Roe and P. Horrocks. *Clin. Sci.* 33(3):481-487, 1967.

Preoperatively dogs were given 0.5 mg d-aldosterone, 5 U vasopressin tannate, and 1-2 mg of 9 alpha-fluorohydrocortisone acetate. After artery or vein catheterization, 16 dogs were given loading doses of 40 mg/kg inulin, 1 mg fluorohydrocortisone and 0.02 U/kg vasopressin intravenously. Constant infusion (1.5 ml/min into the femoral vein) was maintained during the experiment of 2.5% glucose containing inulin (40 mg/kg per hr), vasopressin (0.02 U/kg per hr) and fluorohydrocortisone (180 μg/hr). On completion of control studies, 5% sodium chloride solution was given into either a femoral vein or the portal vein at 0.075 ml/kg per min for 35 min. When sodium excretion returned to a steady state, a second sodium chloride infusion was given by the other route. In 14 experiments, sodium excretion was significantly greater after saline infusion into the portal vein than after femoral vein infusion. In 9 of these experiments inulin clearance was significantly reduced. Infusion of 19% erythritol into either system did not lead to increased sodium excretion but did produce the expected diuresis.

91 **METABOLIC STUDIES IN THE ANHEPATIC DOG AND IN THE ISOLATED PERFUSED CALF AND PIG LIVER.** *(E.)* Vang, J. O. (U. Lund, Sweden). *Acta Univ. Lund* 2(26):1-22, 1967.

Experiments on anhepatic dogs and in isolated perfused calf and pig liver are reviewed with emphasis on comparison of the resultant metabolic aberrations. Blood lactate, pyruvate, and alpha-ketoglutarate levels are elevated after hepatectomy, indicating the maintenance of aerobic metabolism in extrahepatic tissue. The isolated liver can metabolize lactate and maintain a normal lactate/pyruvate ratio when perfused through both the hepatic artery and the portal vein. Venous perfusion only impairs its ability to metabolize lactate and pyruvate, despite a normal lactate/pyruvate ratio. These findings suggest that the lactate oxidation rate can be used to measure isolated perfused liver function. Exogenous citrate was well metabolized in the isolated perfused liver. Elevated blood alpha-ketoglutarate levels, seen in the anhepatic dog and isolated arterial- and venous-perfused liver after exogenous lactate loading, did not occur in the portal vein-perfused liver. Hepatectomy markedly increased plasma unbranched amino acids and decreased branched amino acids, indicating extrahepatic metabolism of the latter. Fatty acids and their derivatives are energy sources in the anhepatic state. The nucleosides uridine and cytosine increased glucose metabolism in incubated anhepatic dog brain slices. Hexose monophosphate shunt activity and utilization of ^{14}C-leucine and 1-^{14}C-palmitic acid were similar in brain slices from intact and anhepatic dogs. Bile flow rates were higher in the venous- and arterial-perfused liver, but bilirubin production is not dependent upon arterial circulation.

92 **CHANGES IN THE INTAKE, GLYCEMIA AND GLYCOGEN IN THE RAT IN THE EARLY STAGES AFTER PARTIAL HEPATECTOMY AND SIMPLE LAPAROTOMY.** *)Cz.)* Simek, J., M. Neradilkova and A. Stransky. *Sbor. Ved. Prac. Lek. Fak. Karl. Univ.* 8(3):331-338, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

93 **A CONTRIBUTION TO THE STUDY OF THE MECHANISM OF EARLY CHANGES IN GLYCOGEN CONTENT IN THE LIVER AND GLYCEMIA AFTER PARTIAL HEPATECTOMY OR MERE LAPAROTOMY.** *(Cz.)* Simek, J., M. Neradilkova and A. Stransky. *Sbor. Ved. Prac. Lek. Fak. Karl. Univ.* 8(3):367-373, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

HEPATIC METABOLISM

94 INHIBITION OF KETONE-BODY FORMATION IN LIVER TISSUE BY *IN VITRO* ADDITION OF HYPOGLYCEMIC AGENTS. [ORAL COMMUNICATION; MED. SOC. GOTTINGEN, GERMANY]. *(Ger.)* Hasselblatt, A. *Klin. Wschr.* 45(24):1262, 1967.

95 EFFECT OF SODIUM ON THE RESPIRATION OF THE RENAL MEDULLA, RENAL CORTEX AND LIVER *IN VITRO*. *(Ger.)* Burck, H. C. (Med. Clin., U. Tübingen, Germany) and F. Petruch. *Klin. Wschr.* 45(23): 1216-1219, 1967.

96 MARKED AORTIC HEMOSIDERIN DEPOSITS IN A PATIENT WITH HEMOCHROMATOSIS. *(E.)* Jankus, A. (Inst. Med. Vet. Sci., Adelaide, Australia), N. G. Ardlie, R. G. Edwards and C. J. Schwartz. *Arch. Path.* 84(4):418-421, 1967.

97 GLUTAMIC DEHYDROGENASE AND ASPARTIC AND ALANINE AMINOTRANSFERASE ACTIVITIES IN CHICK EMBRYO LIVER. *(E.)* Sheid, B. (Columbia U. Coll. Phys. Surg., New York City) and E. Hirschberg. *Amer. J. Physiol.* 213(5):1173-1176, 1967.

98 SULFATE ESTERS OF LITHOCHOLIC ACID AND ITS CONJUGATES: A NEW PATHWAY OF BILE ACID METABOLISM IN HUMANS. [ORAL COMMUNICATION; 40TH ANNUAL MEETING, CENTRAL SOC. CLIN. RES.] *(E.)* Palmer, R. H. (Chicago, Ill.) and M. G. Bolt. *J. Lab. Clin. Med.* 70(5):873-874, 1967.

99 HORMONAL REGULATION AND LIVER ENZYMES. *(E.)* Weber, G. (Indiana U. Sch. Med., Indianapolis). *Gastroenterology* 53(6):984-988, 1967.

100 REGIONAL BLOOD AMMONIA LEVELS IN SUBJECTS FREE OF HEPATIC DISEASE. REPORT 2. *(It.)* Marinaccio, G. (Inst. Spec. Surg. Path., U. Bari, Italy), V. Disanto, S. Ferrarese and V. Ronzini. *Riv. Gastroent.* 19(2):87-90, 1967.

101 SIGNIFICANCE OF HEPATO-INTESTINAL EXCHANGE OF BILIARY SUBSTANCES. *(Rus.)* Shlygin, G. K. (Inst. Nutr. Acad. Med. Sci. USSR, Moscow) and L. S. Vasilevskaia. *Biull. Eksp. Biol. Med.* 64(1):46-51, 1967.

102 EFFECT OF DISTURBANCES IN CARBOHYDRATE METABOLISM ON GLUCURONIC ACID CONJUGATION IN THE LIVER. [ORAL COMMUNICATION, MED. SOC. GÖTTINGEN, GERMANY]. *(Ger.)* Müller-Oerlinghausen, B., A. Hasselblatt and R. Jahns. *Klin. Wschr.* 45(24):1262, 1967.

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DIAGNOSTIC PROCEDURES AND GENERAL THERAPY

103 GASTRIC EMPTYING IN HEALTH AND IN GASTRODUODENAL DISEASE. *(E.)* Griffith, G. H. (Welsh Natl. Sch. Med., United Cardiff & Velindre Hosp., Cardiff, Wales), G. M. Owen, P. H. Campbell and R. Shields. *Gastroenterology* 54(1):1-7, 1968.

The gastric emptying rate was measured by the radioisotope method in 19 gastroenterologically healthy persons and in 27 duodenal ulcer patients, 6 pyloric stenosis patients, 3 gastric neoplasm patients, and 68 patients with various forms of gastric ulcer, to determine whether gastric ulcer, duodenal ulcer, or gastric malignancies affect gastric emptying. All pathologies were diagnosed by X-ray and confirmed during surgery. Patients fasting overnight received a 500 ml breakfast containing radioactive sodium chromate (168 μC). Gastric emptying was faster in the patients with uncomplicated duodenal ulcer than in controls. In patients with ulcer in the body of the stomach, emptying was not delayed. However, in patients with ulcers in the pyloric antrum or gastric ulcers associated with duodenal ulcer, emptying rates were quite variable and frequently prolonged. Emptying was delayed in patients with gastric malignancies or pyloric stenosis. Used for measuring gastric emptying, the radioisotope technique gives highly reproducible results.

104 ORIGIN OF THE "SERRATION" IN INTRAGASTRIC ACIDITY CURVES RECORDED WITH THE "HEIDELBERG CAPSULE". *(Ger.)* Peemöller, H. (Kopernikusstr. 30, Karlsruhe, Germany). *Z. Gastroent.* 5(6):374-377, 1967.

Intragastric pH curves recorded telemetrically with the Heidelberg capsule in normal human subjects showed a regular serration having a frequency of 4-5 oscillations/1.5 min and an amplitude of 0.1-1.0 mm, increased to 1-2 mm by hypertonic dextrose. The serration persisted at about the same frequency during the higher pH values recorded after administration of $NaHCO_3$ or other antacids. Since similar serrations could be produced *in vitro* (in pH 1 or pH 5-6 Titrisol buffer) by rhythmic movements of the capsule, the serration in the intragastric curves is assumed to be the result of peristaltic waves which move the capsule as it lies against the stomach wall. It is suggested that the parameters of this polarization-induced serration could be used to measure gastric motility if properly standardized.

105 NEW STUDIES IN THE FIELD OF CINEMATOGRAPHY WITH THE FIBER-GASTROSCOPE. *(Ger.)* Stoichita, S. (29 Pitar Mos, Bucharest, Rumania), J. Drukman, G. Palivatz and I. Giacomo. *Z. Gastroent.* 5(6):378-380, 1967.

Comparative studies with Hirschowitz fiber-gastroscope, illuminated with incandescent light, and the new cold-light fiber-gastroscope of R. Wolf demonstrated that the latter has significant advantages. Both single pictures and film strips showed better illumination and definition, and Wolf's instrument avoids the danger of overheating and burning the gastric mucosa during gastrocinematography. In addition, the new instrument permits the use of color television, which can be a valuable teaching aid in the endoscopy of digestive diseases.

106 ROENTGENOLOGIC SOURCES OF ERROR IN THE DIAGNOSIS OF COLONIC CANCER. *(E.)* Taskinen, P. J. (Radiother. Clin., U. Helsinki, Finland) and P. Peltokallio. *Ann. Med. Intern. Fenn.* 56(4):195-201, 1967.

In a review of 346 colonic cancer patients, colonic examination resulted in diagnostic error in 50 cases. Many of these mistakes involved chiefly the sigmoid colon (19 cases) and the cecum and ascending colon (each 8 cases). Correct diagnosis was achieved by repeat X-ray examination in 21 cases, by clinical diagnosis of cancer in 8 cases, on autopsy in 2 cases, and through surgery for other reasons in 19 cases. In retrospect, every third error was due to faulty interpretation of the films. Almost half the examinations were technically poor. It is suggested that each region of the colon be twice photographed in two perpendicular projections, once free and once when fully expanded. The most important element is the care and skill of the examiner.

107 AN IMPROVED METHOD FOR MEASURING HUMAN BLOOD BILE ACIDS. *(E.)* Roovers, J. (Lab. Pathol. Biochem., U. Louvain, Belgium), E. Evrard and H. Vanderhaeghe. *Clin. Chim. Acta* 19(3):449-457, 1968.

In the improved method, the alkaline hydrolysis of conjugated bile acids has been replaced by hydrolysis with an enzyme prepared from *Clostridium perfringens*. Each batch was assayed essentially by the technique of Nair et al. Gas-liquid chromatography was used to measure bile acids based on their acetate methyl ester derivatives. Quantitative analysis was refined by using 23-nor-deoxycholic acid as an internal standard. Sample purification was also simplified to permit routine analyses. In studies on plasma and whole blood of 5 normal subjects, total bile acids (deoxycholic, chenodeoxycholic, cholic) was 1-4 μg/ml, compared with plasma levels in cirrhosis of 97.0-109.8 μg/ml. Plasma levels in cholangitis and viral hepatitis were 66.0-67.8 μg/ml. Total plasma bile acids were elevated in a patient with chronic pancreatitis but were not raised in a patient with serum hepatitis. Comparison of parallel analyses of whole blood and plasma indicated that 80% ± 10% of the bile acids are in the plasma; the remainder is apparently bound to corpuscles.

108 TAPE RECORDED TELEVISION MONITORING IN PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. *(E.)* Finck, E. J. (Calif. Coll. Med., Los Angeles), J. I. Eisenman, B. H. Smith and B. J. O'Loughlin. *Amer. J. Gastroent.* 48(6):486-496, 1967.

The indications, technique and roentgen findings of percutaneous transhepatic cholangiography with tape recorded television monitoring were presented in detail. Using this procedure, 37 examinations were performed between 1963 and 1966, the last 11 with the aid of the television tape recorder; the first 25 cases were previously reported. Of the total series, a cholangiogram was obtained in 31 patients giving an overall success rate of 84%. A cholangiogram with television fluoroscopy was obtained in 10 of 11 patients and of these patients, 7 had carcinoma of the head of the pancreas (5), or the ampulla of Vater (1) or bile ducts with intrahepatic metastases (1), while 4 had choledocholithiasis. It was noted that the use of tape recorded television monitoring greatly simplifies the procedure because: a darkened room is not used and therefore, the condition of the aspirated bile can be observed more closely; stop frame and replay techniques allow visualization of fleeting visualized structures without moving the needle; and knowledge of the location of the catheter is accurate and instantaneous.

109 CLINICAL APPRAISAL OF INSULIN GASTRIC ANALYSIS. *(E.)* Stempien, S. J. (Vet. Admin. Hosp., Long Beach, Calif.), E. R. Lee and A. E. Dagradi. *Amer. J. Dig. Dis.* 13(1):21-34, 1968.

One-hundred and thirty-seven peptic ulcer patients were subjected to insulin gastric analysis to determine their postoperative clinical status. Hollander test criteria (a postinsulin rise of 10° with basal anacidity or 20° with measurable basal acidity) were used to extrapolate total acid output assuming a moderate volume response of 100 ml/hr. Hourly rises of 1 to 2 mEq HCl thus obtained were considered "positive", and lower values were considered "negative". This insulin test is useful for measuring the effectiveness of vagotomy, antrectomy, or both. The findings of animal studies that cephalic secretion is basically an integrated neurohumoral response involving vagal release of antral gastrin are confirmed by insulin gastric analysis. This test proved a reliable indicator of postoperative clinical conditions in the patients examined.

110 COMPARATIVE DETERMINATIONS OF LIVER FUNCTION WITH RADIOIODINATED ROSE BENGAL AND SODIUM SULFOBROMOPHTHALEIN. *(Ger.)* Uthgenannt, H. (1st Med. Clin., Acad. Med., Lübeck, Germany), P. Dahl, L. Hesse, U. Burrey and R. Gaedt. *Z. Gastroenterologie* 5(6):355-362, 1967.

Liver function was studied by means of ^{131}I-labeled Rose Bengal (tetraiodofluorescein; 0.1 μC/kg i.v.) in 416 subjects, including 161 healthy controls and 169 patients with hepatitis and/or cirrhosis. In 194 of these subjects, including 48 controls and 106 with hepatitis and/or cirrhosis, liver function was also determined by sodium sulfobromophthalein retention (5 mg/kg i.v.), and in 133 subjects the condition of the liver was verified histologically. In the healthy controls, the geometric mean of the half-life in the Rose Bengal test was 8.188 min, and a value of more than 10.161 min was considered abnormal. With sodium sulfobromophthalein, the geometric mean of the retention at 45 min compared to 3 min was 5.508% and a value of more than 7.71% was considered abnormal. Most patients with hepatitis and/or cirrhosis had abnormal liver function tests, although there were many false negatives, especially in acute hepatitis. The test results were mostly normal in fatty liver or pulmonary and cardiac insufficiency, yielding a total of 34.6% false negatives with Rose Bengal and 29.7% with sodium sulfobromophthalein. The correlation between the results of the two tests was very poor, and it is pointed out that this correlation depends on the parameters of the two functions relating dye concentration in the blood to time. It is therefore recommended that both tests be used in evaluating various stages of the absorption and excretion process, even though essentially the same hepatic mechanisms participate in the excretion of both dyes. The absorption of Rose Bengal from the blood should be determined 4-16 min after injection, to measure the early phase, while the sodium sulfobromophthalein retention should be determined at 45 min.

111 THE ILCA TEST IN THE DIFFERENTIAL DIAGNOSIS OF HEPATIC DISEASE. *(It.)* Falchi, F. (Inst. Gen. Clin. Med. & Med. Ther., U. Pavia, Italy). *Riv. Gastroent* 19(1):1-12, 1967.

A comparative study of the Ilca test (1 ml of a 0.2% aqueous solution of ferric ammonium citrate mixed with 0.1 ml serum and observed after 2-60 min) and the tests of Sellek-Frade, McLagan, Caplan, Costa, Van den Bergh, Takata-Ucko, Weltmann, Wunderly and Whurmann, Hoyt-Morrison and/or Jrgl in 138 patients with a variety of hepatic diseases showed that the Ilca test is particularly effective for distinguishing between hepatocellular and obstructive jaundice. The test was strongly positive in acute icterogenic hepatitis, cirrhosis due to biliary stasis, hepatocholangiitis, and following splenectomy for Cooley's anemia. Clearly negative results were obtained in mild hepatic insufficiency, hepatic disorders due to circulatory stasis, cholecystitis without stones, biliary calculi, and following splenectomy for hemolytic anemia or thrombocytopenia. Variable results were obtained in patients with jaundice due to blood dyscrasias, hepatic cirrhosis, cancer of the liver or bile ducts, and following splenectomy for fibrocongestive splenomegaly. In contrast to most other liver function tests, which are based on dysproteinemia, the Ilca test is based on the increase in serum iron following damage to the liver.

112 LIVER BIOPSY AND SPLENOPORTOGRAPHY IN PATIENTS WITH THROMBOCYTOPENIA. *(E.)* Losowsky, M. S. (General Infirmary, Leeds 1, England) and B. E. Walker. *Gastroenterology* 54(2):241-245, 1968.

Although liver biopsy, splenoportography, or both are not generally recommended for patients with platelet counts below 100,000/mm^3, there is little evidence to support this contraindication. This paper describes 18 patients on whom these procedures were done despite thrombocytopenia. No clinical evidence of significant intra-abdominal hemorrhage was found in any patient. Blood transfusion and vitamin K supplementation are recommended when the patient's condition necessitates liver biopsy and/or splenoportography. With adequate safeguards, the morbidity of the procedures in thrombocytopenic patients need not be regarded as prohibitive.

113 PATHOLOGICAL CORRELATION OF THE ROSE BENGAL ^{131}I PHOTOSCAN IN LIVER DISEASE. *(E.)* Ong, H. (Henry Ford Hosp., Detroit, Mich.), B. Schuman, N. Pushparaj and L. DuSault. *Gastroenterology* 54(1):16-19, 1968.

To determine to what extent the rose bengal ^{131}I photoscan technique could be used to diagnose liver disease, 13 cirrhotic patients, 10 with fatty infiltration, 10 with hepatitis, 23 with malignancies, and 15 with miscellaneous liver conditions were studied following initial biopsy. Biopsy of the last group showed only normal tissue. In cirrhotic patients, 4 had patchy photoscans; 5 showed hepatomegaly and homogeneous uptake; 1 showed inactive areas; and 3 showed normal patterns. Four hepatitis patients had patchy photoscans; 3 were normal, 1 was questionable and hepatomegaly with uniform uptake was found in 2. Of the 23 cases of malignancy studied, 3 photoscans were patchy; 7 showed hepatomegaly with uniform uptake; and 13 showed inactive areas. Normal photoscans were found in 6 miscellaneous cases; 4 had hepatomegaly with uniform uptake; 2 showed inactive areas; and 3 showed patchiness. False negatives are found to occur where lesions are less than 2 cm, where liver thickness is greater than 10 cm and when lesions occur on the posterior liver surface. Anatomical variations were found to effect ^{131}I uptake. No correlation was found between photoscans and the changes in liver function tests in chronic diffuse liver disease.

114 **THE VALUE OF LIVER SCAN IN MANAGEMENT OF CANCER OF THE LARGE BOWEL.** *(E.)* Gutierrez, R. R. (Temple U. Med. Ctr., Philadelphia, Pa.), H. E. Bacon and A. R. Gennaro. *Dis. Colon Rectum* 11(1): 61-63, 1968.

Rose bengal labeled with ^{131}I (150-200 μC) and colloidal ^{198}Au (100-300 μC) were intravenously injected into 118 patients undergoing liver scans. Liver status was determined by laparotomy in 109 patients and by biopsy and/or autopsy in the other 9 patients. All patients except 8 underwent operations for colon, rectum, or anal canal cancer. Hepatic metastasis was found in 14 out of 109 subjected to laparotomy. In 91 patients with normal liver scans, 6 had small metastases of the liver. With the exception of 1 patient with an elevated alkaline phosphatase level, other liver function tests were normal in the 6. Abnormal scans were found in 25 cases; 22 of these were attributed to metastatic lesions, 2 to diffuse parenchymal disease and 1 to poor reticuloendothelial function. There was only 1 false positive scan. Of 2 with "probable abnormal scans," 1 patient had multiple cysts of the liver and kidneys; the other was normal. Preoperative liver scans predicted liver metastasis in 72% of cases studied as opposed to 50% of cases with abnormal (elevated) alkaline phosphatase levels.

115 **ROENTGENOGRAPHIC MUCOSAL PATTERNS IN THE "MALABSORPTION SYNDROME." A SCHEME FOR DIAGNOSIS.** *(E.)* Swischuk, L. E. (U. Oklahoma Med. Ctr., Oklahoma City, Okla.) and J. D. Welsh. *Amer. J. Dig. Dis.* 13(1):59-78, 1968.

A study correlating general radiographic small bowel patterns, specific roentgenographic mucosal changes, intestinal histology, and absorption studies was made in 79 patients with satisfactory small bowel biopsies and roentgenograms. Urinary D-xylose excretion following a 25 g oral dose, quantitative stool fat determinations while patients were on a fat diet (100 g/day), radioactive triolein absorption tests, and serum albumin determinations were done on all patients. The results of these tests were reviewed and the patients were grouped and discussed as follows: control (normal); adult celiac disease, treated and untreated; diseases causing thickening of mucosal folds; those who had had a gastrectomy; and miscellaneous, showing abnormal roentgenograms but normal histology. Criteria for satisfactory differentiation of these groups were developed along with a practical approach to roentgenographic differentiation of these diseases.

116 **EXPERIMENTAL ORAL HEPATOGRAPHY IN RATS.** *(E.)* Zboralske, F. F. (Stanford U. Sch. Med., Palo Alto, Calif.), F. R. Margolin, O. N. Rambo and S. Riegelman. *Invest. Radiology* 3(1):35-43, 1968.

Conditions permitting transitory opacification of the liver after oral administration of a radiopaque material (Lipiodol) to rats are defined. Diagnostic opacification was not obtained in fed animals; in rats fasting 12 hr before administration of Lipiodol (3 ml), liver opacification resulted in 27%. In the fasting rats, the incidence of opacification was higher when the 3 ml dose was divided and spread over the first 24 hr than when given as a single dose. With a total dose of 4.5-5.0 ml given in 24-hr increments, the highest degree (80%) of diagnostic opacification occurred in the rats receiving 1.5 ml/day for 3 days; however, this was achieved at a mortality of 60%. Minimal usable opacification required 11 mg of iodine (27 mg of Lipiodol) per gram of liver. In the animals which died, the three major pathologic changes were bilateral pleural effusions, pulmonary congestion, and edema with focal hemorrhage and pronounced hepatic vascular congestion.

117 **GASTROINTESTINAL ABSORPTION AND BILIARY EXCRETION OF PHENOLSULFONPHTHALEIN (PHENOL RED) IN MAN.** *(E.)* McLeod, G. M. (Central Middlesex Hosp., London, England), A. B. French, C. J. Good and F. S. Wright. *J. Lab. Clin. Med.* 71(2):192-200, 1968.

Gastrointestinal absorption and urinary and biliary excretion of sulfonphthalein (PSP) were studied in normal subjects and 3 groups of patients: postcholecystectomy and common bile duct exploration patients receiving 6 mg i.v. and 60 mg oral doses of PSP; nontropical sprue and postgastrectomy patients receiving 6, 30, 60, and 120 mg oral and 6 mg i.v. PSP (with intestinal perfusion to study glucose absorption); and post ileostomy-colectomy patients receiving 60 mg oral PSP doses. PSP levels were spectrophotometrically measured at 560 mμ. Six hr after a 6 mg i.v. injection of PSP, 80-90% had been excreted in the urine; 5-13% of orally administered doses were excreted after 24 hr. There was no significant difference in PSP excretory rates in normal and sprue patients. Biliary excretion of PSP, 6 hr after 6 mg was given i.v., was 0.172 mg. Ileostomy contents showed 80-90% recovery after a 60 mg oral dose. Intestinal perfusion of glucose with 0.06 mg PSP/ml was followed by urinary excretion of 2% of the original dose after 24 hr. PSP is absorbed primarily in the stomach and duodenum. The amounts of PSP recovered from urine and bile after oral administration were so small that they do not interfere with the use of PSP as an essentially nonabsorbable dilution indicator in certain perfusion studies of intestinal absorption.

118 **A RAPID SCREENING TEST FOR GASTRIC ACHLORHYDRIA.** *(E.)* Beal, C. B. (Stanford U. Med. Sch., Palo Alto, Calif.) and J. E. Brown. *Amer. J. Dig. Dis.* 13(2):113-122, 1968.

A rapid screening test for gastric achlorhydria was performed in 500 subjects, 126 of whom were subjected to gastric analyses. A congo red-impregnated thread is coiled in a gelatin capsule and swallowed; the free end of the thread, protruding through a hole in the capsule remains in the mouth. The thread unwinds as the capsule descends and the color changes from red to black as the alimentary tract pH decreases. A good correlation (93%) was found between this test and intubation gastric analysis. The "tubeless" gastric analysis can detect hyperchlorhydria, whereas the thread test cannot; but neither test can distinguish hypochlorhydria from achlorhydria. Both are screening tests. In a test of 370 adults over 40 yr of age, only 3 were found to be achlorhydric. Correlation of the determined pH by gastric analysis and the thread test was found questionable or lacking in only 9 out of 136 cases.

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119 DIAGNOSTIC VALUE OF FECAL CHYMOTRYPSIN AND TRYPSIN ASSESSMENT FOR DETECTION OF PANCREATIC DISEASE: A COMPARATIVE STUDY. *(E.)* Ammann, R. W. (U. Zurich, Switzerland), E. Tagwercher, H. Kashiwagi and H. Rosenmund. *Amer. J. Dig. Dis.* 13(2):123-146, 1968.

A study was performed to determine the fecal trypsin and chymotrypsin activities in normal patients and patients with varying degrees of pancreatic exocrine insufficiency and to estimate the diagnostic value of trypsin and chymotrypsin screening assays. The results of pancreozymin-secretin tests (duodenal aspirate measurements of volume, pH, bicarbonate, amylase, trypsin and chymotrypsin concentrations) agreed with those of fecal pancreatic exocrine enzyme studies. False-positive fecal chymotrypsin values (<120 μg/g feces) occurred in 10% of control studies. False-negative results were found in 13% of pancreatic insufficiency patients, the incidence decreasing with the severity of the condition. Fecal chymotrypsin activity is a sensitive assay for detecting chronic pancreatitis and pancreatitic carcinoma. Repeated determinations of fecal enzyme activity are useful in differentiating acute reversible and chronic progressive pancreatic disease. Fecal trypsin activity alone is less reliable because of the high incidence of false-positive and false-negative results. The trypsin/chymotrypsin ratio is more valuable in estimating pancreatic insufficiency. Fecal enzyme screening limits application of the more complicated pancreozymin-secretin test to a small number of select patients with low fecal chymotrypsin activity.

120 COLONIC ILEUS AND ITS DIFFERENTIAL ROENTGEN DIAGNOSIS. *(E.)* Bryk, D. (Jewish Hosp. Med. Ctr., Brooklyn, N. Y.) and K. Y. Soong. *Amer. J. Roentgen.* 101(2):329-337, 1967.

Plain roentgenogram findings in 50 cases of colonic ileus were compared with roentgenogram findings in 70 cases of low colonic obstruction due to carcinoma or diverticulitis. Diagnostic features in ileus included continuous gaseous dilation, minimal fluid, regular preserved haustrations, thin well-defined septa, smooth inner colonic contour, and normal consistency of the fecal contents. Criteria which would favor obstruction include noncontinuous gaseous colonic distention, fluid-filled right colon, accentuation of haustrations with numerous closely packed septa or loss of shallowness of haustrations, large amounts of retained fecal material, thickened ill-defined irregular septa, ragged inner colonic contour, and grey mottled fluid.

121 A COMPARISON OF THE HORIZONTAL AXIAL VIEW AND THE CLASSICAL CHASSARD-LAPINE VIEW OF THE SIGMOID COLON. *(E.)*. Dunbar, J. D. (Ohio State U. Hosps., Columbus), A. C. Mitchell and B. B. Greaves. *Amer. J. Roentgen.* 101(2):322-324, 1967.

In a study of possible redundancy of the sigmoid colon, both the classical sitting Chassard-Lapine and the horizontal axial view were obtained in 50 patients. It is concluded that both views are equal in ability to separate redundant loops free of each other. However, it is felt that the horizontal axial view is more easily obtained, especially in elderly, less supple patients.

122 CLINICAL AND SEROIMMUNOLOGICAL RESULTS OF THERAPEUTIC TRIALS OF CIBA 32,644 Ba-IN 350 CASES OF CHRONIC BILHARZIASIS DUE TO *SCHISTOSOMA HAEMATOBIUM* AND *SCHISTOSOMA MANSONI*. *(Fr.)* Gentilini, M. (Antoine-Chantin Hosp., Paris, France), A. Capron, J. C. Le Parco, A. Vernes, J. Biguet and A. Domart. *Bull. Soc. Path. Exot.* 60(3):241-263, 1967.

Niridazole (Ambilhar = Ciba 32,644; 25 mg/kg/day p.o. before meals, for 7 days) was used in the treatment of 350 cases (95% males, 8-55 yr old) of urinary or intestinal schistosomiasis caused by *Schistosoma haematobium* and *S. mansoni*, resp. Among 50 cases of intestinal schistosomiasis, all of whom had positive stools before treatment, negative stools were obtained in 16 of 19 examined after 1 month, 14 of 14 after 3 months and 6 of 8 after 1 yr. The percentage of cure was somewhat higher in urinary schistosomiasis (300 cases). This rebound phenomenon and reduced sensitivity to treatment in the case of *S. mansoni* infestation was confirmed by immunoelectrophoretic studies which revealed specific precipitins in the serum of the following groups:: 201 out of 267 urinary cases and 27 of 33 intestinal cases before treatment; 128 of 161 urinary cases and 18 of 20 intestinal cases after 7 days; 49 of 56 urinary cases and 10 of 10 intestinal cases after 1 month; 6 of 18 urinary cases and 4 of 5 intestinal cases after 1 yr; and in 7 of 10 urinary cases and 3 of 3 intestinal cases after a second course of treatment. Niridazole had no effect on the blood picture or liver function tests, although transitory eosinophilia appeared 15 days after the end of treatment. Complications included acute hallucinations in 6 cases (all among the 100 cases who did not receive concurrent diazepam), minor mental symptoms in 27, convulsions in 3, headache in 137 (severe in 56 of 137), and repolarization disturbances in the ECG in almost all cases studied. Combination with diazepam (i.m. or p.o.) reduced the incidence of gastrointestinal side effects (anorexia, nausea, vomiting, abdominal pain or diarrhea) from 43% to 10-13%, and increased the percentage of patients reporting good overall tolerance from 30% to 57-74%.

123 GENERAL CONCLUSIONS: THE CURRENT PLACE OF THE GRAPHIC METHOD IN GASTROENTEROLOGY. *(Fr.)* Besancon, F. (14 Blvd. Emile Augier, Paris, France). *Acta Gastroent. Belg.* 30(10):704-707, 1967.

A brief review of the role of graphic motility studies in the overall development of contemporary gastroenterology deals with the financial and human requirements posed by the necessary equipment for such studies, the diagnostic value of this approach in esophageal pathology (dysphagia, retrosternal pain, Raynaud's disease) and biliary tract disease, the difficulty of extrapolating from transitory pharmacodynamic effects on the tracings to therapeutic measures, the theoretical significance of the tracings, and the difficulty of interpreting motility studies due to the lack of systematization in the field. It is emphasized that motility studies should not become a subspecialty of gastroenterology but must be considered together with all other possible approaches.

124 CHEMOTHERAPY OF SCHISTOSOMIASIS. *(E.)* Jordan, P. (Res. Control Dept., Castries, St. Lucia, West Indies). *Bull. N.Y. Acad. Med.* 44(3):245-258, 1968.

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In a discussion of schistosomiasis treatment over the past 15 yr, a nitrothiazole compound, niridazole (formerly known as Ciba 32,644 Ba) was reported to be effective in treating *Schistosoma mansoni* and *S. haematobium* infections. Adult *S. mansoni* worms and ova absorb the compound and are killed. The standard course of treatment is 25 mg/kg/day for 5-7 or 10 days. The frequency of side effects appears to be less than with other schistosomicidal drugs and children tolerate it well, although patients with *S. japonicum* showed mild to severe mental disorientation from the drug. In man and animals, a transitory inhibition of spermatogenesis was reported. After treatment, urinary tract lesions reverted to normal in a small series of cases from Nigeria, while this was not found to be the case in a series from East Africa. In preliminary trials in St. Lucia, lucathone hydrochloride tables coated with a new enteric covering were found free of distressing side effects commonly associated with lucathone. Since many of the presently available drugs appear to be of equal value, careful standardization of the methodology of drug tests is essential in order to allow comparison of parasitological effects found by different workers. Also discussed are the objectives of chemotherapy, the modes of action of schistosomicidal drugs, selection of patients for treatment, and the effect of treatment on schistosome lesions.

125 SEROLOGIC DIAGNOSIS OF SCHISTOSOMIASIS. *(E.)*

Kagan, I. G. (Natl. Communicable Dis. Ctr., Atlanta, Ga.). *Bull. N.Y. Acad. Med.* 44(3):262-277, 1968.

The effectiveness of various immunologic tests available for the diagnosis of schistosomiasis were discussed and compared. Reproducible results are now obtained with the intradermal test when properly standardized antigens are employed. The fluorescent antibody test can be made very sensitive or insensitive by adjusting the concentration of the rhodamine bovine albumin in the preparation of the cercarial antigen. The cercarial slide flocculation test has proved to be both reliable and useful but cross-reactivity with sera from patients with other parasitic diseases presents problems. The bentonite flocculation test was not as sensitive as the cercarial slide flocculation test. With fresh antigen the charcoal plasma card test is both sensitive and specific but with old antigen the charcoal clumps making the test difficult to read. Although the complement-fixation test is probably the best serologic procedure, the author has not found it to be as sensitive as other tests. The circumoval precipitin test is very useful in the diagnosis of cerebral *Schistosoma japonicum*. Due to the use of living, infectious cercariae in the cercarienhullen reaction test it is not useful as a routine procedure. The indirect hemagglutination test is used by the author in his seroepidemiological studies.

126 SWEET DIARRHEA: ROENTGEN DIAGNOSIS OF DISACCHARIDASE DEFICIENCY. *(E.)*

Preger, L. (U. California, San Francisco Med. Ctr.) and J. R. Amberg. *Amer. J. Roentgen.* 101(2):287-295, 1967.

A technique for the roentgenographic diagnosis of disaccharidase deficiency involves administration of 300-360 ml of a nonflocculating suspension of barium to which 50 or 100 g of lactose had been added. The subsequent lactose tolerance curve was considered abnormal if the glucose level rose less than 20 mg%. Such flat curves were seen in 2 of 7 normal subjects, 6 of 15 patients with diarrhea or primary gastrointestinal tract disorder, and in 4 of 10 patients with prior subtotal gastrectomy. The small bowel roentgenograms of the 16 with normal lactose tolerance curves were similar with or without added lactose. In the 10 with flat lactose tolerance curves the roentgenograms of the small and large intestine showed distension and dilution of the barium-lactose mixture; more rapid transit time was also seen in the large intestine. These findings were always accompanied by diarrhea and cramps. When maltose or sucrose was added to the barium, the barium column became more concentrated due to normal absorption of water.

127 THE PHARMACOLOGICAL BASES OF THE TREATMENT OF DISORDERS IN GASTROINTESTINAL MOTILITY. *(Fr.)*

Vantrappen, G. (Acad. Hosp., St. Rafael, Belgium), J. Hellemans and J. Janssens. *Acta Gastroent. Belg.* 30(10):646-658, 1967.

Following a schematic review of the sympathetic and parasympathetic innervation of the gastrointestinal tract, a distinction is drawn between the inhibitors and stimulators of gastrointestinal motility and the mechanism of action of each type of drug is briefly elucidated. The inhibitory drugs or antispasmodics include parasympatholytics, sympathomimetics, musculotropic spasmolytics, ganglioplegics, local anesthetics and drugs acting on the CNS, as well as the agents such as morphine and other opiates which inhibit intestinal peristalsis. Agents which stimulate gastrointestinal motility include acetylcholine, anticholinesterases, barium ions, chelating agents, potassium ions, adenosine triphosphatase inhibitors, gastrin, substance P, bradykinin, villikinin, histamine, and serotonin.

128 EVALUATION OF THE ANTHELMINTIC ACTIVITY OF THIABENDAZOLE IN MAN. *(E.)*

Salem, H. H. (U. Mosul, Iraq), Z. G. Hayatee, A. M. Awaness and G. Al-Allaf. *J. Trop. Med. Hyg.* 71(1):11-17, 1968.

The anthelmintic activity of thiabendazole was investigated in 204 patients, aged 4-35 yr, with varying degrees of ascariasis, ancylostomiasis, enterobiasis, trichuriasis, and *Hymenolepis nana* infestation. The drug was administered to patients irrespective of age, sex, or condition in 50 mg/kg doses in 48 hr. Stool egg counts were made weekly for 6-8 wk after treatment. Complete cures were found in 71.8% of ascariasis patients; egg counts were markedly reduced after 1 week. Five patients experienced parasite recurrences and were retreated. In trichuriasis patients, there was a 37.7% cure after a 6-week follow-up. Some patients found to be egg-free at 2 weeks had egg reappearance at 3 weeks, due to a combination of suppressed drug toxicity and periodicity of the egg-laying female. A 50% cure was noted in ancylostomiasis patients, although all patients felt better after initial treatment. There was an 80% cure in enterobiasis patients and a 90% cure after a second dose of thiabendazole. All *Hymenolepis nana*-infected patients were children and 11 of 21 patients studied were worm-free in 7-21 days. Mild side-effects, such as nausea, anorexia, and dizziness were noted in some patients; 5 out of 204 patients failed to complete therapy due to drug sensitivity. Side-effects can be eliminated by adjusting the drug dosage to the individual patient.

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29 **LACTOSE LOADING.** *(E.)* Desai, H. G. (Tata Mem. Hosp., Bombay, India), A. V. Chitre and :. N. Jeejeebhoy. *Gastroenterologia* 108(4):177-188, 1967.

actose tolerance and jejunal lactase activity were compared ith results of lactose loading tests in 57 patients with small owel disease (41 with tropical sprue, 7 with gastroenteritis, with giardiasis, and 4 with Polya-gastrectomy) and in 18 ealthy controls. In the controls, the mean and range of maxnum blood sugar rise in the tolerance test was 32 (10-72) ng/100 ml after the administration of oral lactose. Three conrol subjects with low lactase activity in the jejunum showed nuch higher lactase activity in the ileum. All controls tolerated 0 g of lactose; the mean and range of minimum lactose loading ausing a liquid stool was 73 (50-120) g. In the test subjects, he mean and range of the maximal blood sugar rise in the lacose tolerance test was 14.6 (0-47) mg/100 ml in sprue patients, .2 (0-19) mg/100 ml in non-specific diarrhea patients, 40.2 14-90) mg/100 ml in giardiasis patients, and 6.3 (0-19) mg/100 nl in Polya-gastrectomy patients. In the patients whose lactose olerance curve was flat, monosaccharide absorption was normal ccording to glucose-galactose tests and the flat lactose tolerance urve was due to lactase deficiency. The mean and range of actase activity in jejunal mucosa specimens was 2.0 (0-17) units n sprue patients, the lactase level being less than 1.0 unit in 64%. actase activity was absent in all diarrhea patients, and was 14.3 0-28) units in giardiasis patients and 1.25 (0-4.7) units in Polyaastrectomy patients. Giardiasis and Polya-gastrectomy patients ith low lactase activity in jejunal mucosa showed significantly igher levels in the ileum. The mean and range of the minimum oad of lactose producing diarrhea was 49.3 (20-100) g in sprue atients, 30 (10-40) g in non-specific diarrhea patients, 100 40-140) g in giardiasis patients, and 55 (40-70) g in Polya-gasrectomy patients. The oral lactose loading test was judged uperior to the lactose tolerance and lactase activity tests, since t indicates lactase activity of the entire small intestine, avoids alse indications of lactase deficiency, and is simple, reliable, nd reproducible.

30 **GASTROSCOPY WITH BIOPSY AND CYTOLOGICAL SAMPLING UNDER DIRECT VISION.** *E.)* Williams, D. G. (Radcliffe Infirmary, Oxford, England), S. C. Truelove, M. W. L. Gear, G. R. Massarella and N. W. Fitzgerald. *Brit. Med. J.* 1(5591):535-539, 1968.

Initial experiences are reported on the use of the Olympus G.F.B. fiberscope and gastro-camera. A side channel is incorporated into the instrument which permits passage into the stomach of biopsy forceps, cytology brushes, or water jets; biopsies can thus be taken under direct vision. Among 15 patients with hematemesis and negative barium examination, gastroscopy in all but one case showed acute gastric ulcer, gastric erosions, or superficial gastritis. Five of 24 referred because of suspected carcinoma appeared to have a carcinoma; 4 of these were confirmed at operation. Among 16 with symptoms suggestive of peptic ulcer but with negative or inconclusive barium meal, 3 were found to have ulcer, 2 to have erosions, and 5 to have superficial gastritis. Among 20 with clinical and radiological diagnosis of benign gastric ulcer, 3 were found to have cancer. In 46 patients from whom biopsy and cytological specimens were taken there was agreement in 41 (89%) between the gastroscopic and microscopical diagnosis.

131 **SOME NEW APPROACHES TO THE EXAMINATION OF THE GASTROINTESTINAL TRACT.** *(E.)* Margulis, A. R. (U. California, San Francisco Med. Ctr.). *Amer. J. Roentgen.* 101(2):265-286, 1967.

A review is presented of some of the newer approaches available to the radiologist for the examination of the gastrointestinal tract. Neostigmine is cited as an example of the use of pharmacologic agents in diagnosis: in the normal subject peristaltic action would be exaggerated whereas in sprue there would be no response. Addition of substrates to barium to obtain abnormal diagnostic patterns has been used in the diagnosis of disaccharidase insufficiency. Induced changes in blood volume can facilitate certain examinations such as varices in esophagrams. In the diagnosis of disease of the colon, new approaches include the silicone foam enema, visualization of colonic lipomas with low kilovoltage without contrast media, and the peroral double contrast examination of the right colon. Among newer approaches to the examination of the liver is the use of controlled position in transhepatic cholangiography, selective hepatic arteriography, portal venography by selective splenic arteriography, and percutaneous umbilical venography for the introduction of a catheter into the portal system. Interventional roentgenography is briefly discussed as is the recording of physiologic data simultaneously with cineradiography.

132 **CURRENT POSSIBILITIES AND CLINICAL LIMITATIONS OF GASTROSCOPY: A REVIEW OF EXPERIENCE WITH 1000 CASES.** *(It.)* Mazzoni, P. (1st Surg. Clin., U. Rome, Italy) and G. Monaco. *Chir. Gastroent.* 1(3):343-359, 1967.

Gastroscopy failed to yield usable results in only 3 out of 1064 patients subjected to this procedure in recent years, one of these failures being due to psychomotor agitation and two to lordosis of the cervical spine. Positive diagnostic findings were obtained by gastroscopy in 326 out of 337 cases of gastric ulcer; 267 out of 270 cases of gastric tumors (232 malignant); 183 out of 215 cases of post-operative peptic ulcer; 26 out of 31 cases of cancer developing from an ulcer; 62 out of 126 cases of gastritis; and 84 out of 85 others. In all conditions except gastritis, gastroscopy yielded a higher proportion of positive findings than X-ray examination, but it is emphasized that the two techniques complement each other. The advantages and possibilities of gastroscopy are discussed in detail for gastritis, peptic ulcer, gastric tumors and the resected stomach; and the advantages of the Hirschowitz fiberscope over the earlier rigid gastroscopes are emphasized. The proper technique for examination of the stomach and the possible use of the fiberscope for photography and biopsy are outlined. The principal contraindications and factors limiting the usefulness of gastroscopy are: stomatitis, pharyngitis, pharyngeolaryngeal ulceration, scleroderma, temporo-maxillary ankylosis, lordosis of the cervical spine, kyphosis or deformation of the backbone, esophageal lesions (e.g., diverticula, varices, or spasms), hyperexcitability, goiter, lung disease, bronchial disease, heart disease, severe arteriosclerosis, diaphragmatic hernia, severe debilitation, and aortic aneurysm. Successful gastroscopy is facilitated by premedication with morphine and atropine 30-40 min before insertion of the gastroscope under local anesthesia, careful gastric lavage and aspiration before and during the examination, and the use of gastric insufflation.

133 MODERN PROCEDURES FOR THE STUDY OF GASTRIC CHEMISTRY. *(Sp.)(Rev.)* Meeroff, J. C. and (Prof. G. A. Alfaro Polyclin., Buenos Aires, Argentina), J. A. Rofrano, N. Marchevsky, and M. Meeroff. *Rev. Esp. Enferm. Apar. Dig.* 26(10):1203-1213, 1967.

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135 DIAGNOSIS OF GASTROINTESTINAL BLEEDING BY MESENTERIC ARTERIOGRAPHY. *(E.)* Nusbaum, M., and S. Baum. Pp. 245-259 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson. (Eds.). New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

136 COMPARISON BETWEEN TWO METHODS OF EGG-COUNTING IN FECES, IN RELATION TO ITS EFFICIENCY IN EVALUATING ANTIPARASITIC DRUGS. *(Sp.)* Biagi, F. (Fac. Med., Nat. Auton. U. Mexico, Mexico City), J. Zavala and F. Malagon. *Bol. Chile. Parasit.* 22(3):99-104, 1967.

137 VISUALIZATION OF FILLING DEFECTS IN A LIVER PHANTOM CONTAINING ^{99}Tc, ^{197}Hg, ^{131}I OR ^{198}Au USING A RECTILINEAR SCANNER OR SCINTILLATION CAMERA. *(E.)* Loken, M. K. (U. Minnesota Hosp., Minneapolis) and D. Gerding. *Amer. J. Roentgen.* 101(3):551-556, 1967.

138 RUBBER LIGATURE FOR CHOLANGIOGRAPHIC CATHETER FIXATION. *(E.)* Goodman, J. M. (Eden Hosp., Castro Valley, Calif.). *Amer. J. Surg.* 114(6):972, 1967.

139 NONVISUALIZATION OF GALLBLADDER CAUSED BY HIATAL HERNIA. *(E.)* Ochsner, S. F. (Ochsner Clin., New Orleans, La.) and B. C. Buchtel. *Amer. J. Roentgen.* 101(3):589-591, 1967.

140 DIAGNOSTIC SIGNIFICANCE OF ABDOMINAL MURMURS. *(E.)* Editorial. *Canad. Med. Ass. J.* 98(3):172-173, 1968.

141 POSTMORTAL ANGIOGRAPHY OF ABDOMINAL ORGANS. *(Cz.)* Luzsa, G. (Mosonmagyarovar, Hungary). *Cesk. Radiol.* 19(2):78-84, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967].

142 COMMUNICATION ABOUT A NEW ABSORPTION SUBSTANCE OPADUR. *(Cz.)* Houdek, P. and J. Koci. *Cesk. Radiol.* 19(3):212-215, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967].

143 REGENERATION OF THE LYMPH AND BLOOD VESSEL OF THE WALL OF THE SMALL INTESTINE OF DOGS AFTER DIFFERENT TYPES OF INTESTINAL SUTURES. *(E.)* Bocharov, V. Ya. (Moscow, USSR) and I. D. Kirpatovskii. *Folia Morphol.* 13(2):170-174, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967].

144 MEASUREMENT OF GASTRIC EVALUATION TIME BY TEST MEAL IN PEPTIC ULCER CASES. *(Cz.)* Horcicka, V. and V. Pelikan. *Vnitrni Lek.* 11(4):349-355, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

145 METHODS FOR BILIRUBIN DETERMINATION. *(Cz.)* Teyschl, O., A. Tuma and D. Srackova. Pp. 5-13 in *Some Problems of Pediatric Hepatology* (v. 21 of *Acta Fac. Med. Univ. Brunen.)* Toman, M. (Ed.). Brno, 1965. 129 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

146 ANLEITUNG FÜR DIE ENDOSKOPISCHE UND BIOPTISCHE UNTERSUCHUNG VON SPEISERÖHRE, MAGEN, LEBER, NIERE (INTRODUCTION TO THE ENDOSCOPY AND BIOPSY OF THE ESOPHAGUS, STOMACH, LIVER AND KIDNEYS). *(Ger.)* Kuhlmann, H. and H. Sudhof. *Stuttgart, F. K. Schattauer, 1966. 75 pp.*

147 CONDITIONS NECESSARY FOR THE IMPROVEMENT OF THE RADIOLOGICAL DIAGNOSIS OF TUMORS OF THE OESO-CARDIO-TUBEROSITARY REGION, BASED ON 48 CASES. *(Fr.)* Albot, G. (Coll. Med. Hosp., Paris, France), G. Berthet, J. Boisson and J. Bou. *Arch. Mal. Appar. Dig.* 56(12):1169-1208, 1967.

148 ELIMINATION OF MAGNIFICATION ERRORS IN COMPARISON ROENTGENOGRAMS USED WITH RADIOISOTOPE SCANS. *(E.)* Bogardus, C. R., Jr. (U. Oklahoma Med. Ctr., Oklahoma City), M. G. Walters, C. E. Prather and V. Ficken. *Amer. J. Roentgen.* 101(3):585-588, 1967.

149 QUANTITATIVE DETERMINATION OF PROTEINS EXCRETED IN THE FECES. *(Ger.)* Wagner, A. (Med. Polyclin., U. Heidelberg, Germany). *Klin. Wschr.* 45(20):1056, 1967.

150 THE USE OF RADIOISOTOPE SCANNING IN MEDICAL DIAGNOSIS: APPLICATIONS IN DISEASES OF BRAIN, LUNG, LIVER AND HEART. [SYMPOSIUM]. *(E.)* Webber, M. M. (UCLA Sch. Med., Los Angeles, Calif.), W. E. Bloomer, P. H. Crandall, J. Drinkard, G. Glober, H. H. Herbst, D. E. Johnson, F. A. Killeffer, R. N. McAlpin, M. A. Pops, W. E. Stern, L. Swanson, G. V. Taplin and W. A. Weidner. *Ann. Intern. Med.* 67(5):1059-1083, 1967.

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ein, G. N. Pp. 57-58 in *Current Perspectives in Gastro-
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enezuela) and J. A. Araujo. *G.E.N.* 22(1):21-38, 1967.

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ECHNIQUE AND RESULTS. *(Fr.)* Debray, Ch. (Paris,
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164 COTTON WRAPPING TECHNIQUE FOR REMOVING POINTED FOREIGN OBJECTS FROM THE GASTROINTESTINAL TRACT. *(E.)* Clayton, R. S. (1501 Arizona Ave., El Paso, Texas). *Amer. J. Roentgen.* 101(2):490-491, 1967.

165 ROENTGEN VISUALIZATION OF PHLEBOLITHS IN HEMANGIOMA OF THE GASTROINTESTINAL TRACT. *(E.)* Grieco, R. V. (Methodist Hosp., Brooklyn, N. Y.) and N. F. Bartone. *Amer. J. Roentgen.* 101(2):406-408, 1967.

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167 STUDY OF ONE UTILIZATION OF METOCHLOPRAMIDE IN RADIOLOGIC EXAMINATION OF THE GASTRO-INTESTINAL TRACT. *(Rum.)* Lungeanu, M. (Dr. I. Cantacuzino Hosp., Bucharest, Rumania) and E. Ilie. *Med. Intern.* 20(1):81-86, 1968.

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176 **SIDE EFFECTS OF ANTIBIOTIC THERAPY: SUPERINFECTIONS.** *(Por.)* Suassuna, I. (U. Guanabara, Rio de Janeiro, Brazil) and I. Rocco Suassuna. *Arq. Gastroenterol.* 4(4):313-336, 1967.

177 **VALUE OF BROXOQUINOLEIN-BROBENZOXALDINE IN THE TREATMENT OF GIARDIASIS.** *(Sp.)* Link, A. (U. Chile, Santiago) and E. Cassorla. *Bol. Chile Parasit.* 22(3):104-106, 1967.

178 **THE DEVELOPMENT OF FIBROSCOPY IN THE AREA OF ESOPHAGOGASTRIC ENDOSCOPY.** *(Fr.)* Debray, C. (Paris) and P. Housset. *Acta Gastroent. Belg.* 30(12):819-820, 1967.

179 **ENZYME ASSAY OF PERORAL BIOPSIES: STORAGE CONDITIONS AND BASIS OF EXPRESSION.** *(E.)* Walter, W. M. (USDA, Raleigh, N. Car.) and G. M. Gray. *Gastroenterology* 54(1):56-59, 1968.

See also abstract nos.: 64,186,268,379,442,443,539,598,750

GASTROINTESTINAL DISEASES

GENERAL

0 **DEMONSTRATION AND EVALUATION OF
THE PATHOGENICITY OF CERTAIN INTES-
NAL PARASITES BY MEANS OF COPROLOGICAL
ESTS.** *(Fr.)* Bailenger, J., J. (Sch. Med. & Pharm., Bordeaux,
ance), J. Dubarry and F. Seguin. *Arch. Mal. Appar. Dig.*
(11):1085-1094, 1967.

ool specimens from 849 normal subjects, 334 with tricho-
phaliasis, 72 with giardiasis, 45 infested with *Entameba coli,*
d 98 harboring various combinations of these parasites were
amined microscopically and chemically. Comparison of the
sults revealed certain specific changes associated with infes-
tion by specific parasites or combinations of parasites.
us, organic acid content was highest in patients infested with
iardia plus *Trichocephalus* or *Ascaris* plus *Trichocephalus,*
d was subnormal in amebic dysentery. Formol nitrogen, on
e other hand, was elevated only for the combination of
iardia plus *Trichocephalus,* and was subnormal for ascariasis
us trichocephaliasis; the organic acid:formol nitrogen ratio
as elevated for ascariasis plus trichocephaliasis and subnormal
r the combinations of *Giardia* plus *Trichocephalus* or *Giardia*
us *Entameba coli.* The pH of the feces was generally in-
eased by parasitism, except for ascariasis plus trichocephaliasis.

he percentage of patients showing nondegraded dissolved pro-
in in the feces was higher than normal for all infestations ex-
ept amebic dysentery, in which it was subnormal; the per-
entage of patients with mucus in the feces was highest in
nebic dysentery, especially when combined with *Giardia* or
richocephalus. Increased peristalsis together with deficient
rotein digestion is most characteristic of giardiasis. Giardiasis
verity is aggravated by a hyperactive proteolytic bacterial
ora, whose proliferation is enhanced by the presence of nonde-
aded protein and which produces by-products which irritate
e mucous membrane of the colon. Since *Trichocephalus* and
ntameba coli produce a similar imbalance in the intestinal
ora, infestations of these parasites in combination with *Giardia*
e the most serious for the patient.

81 **MASSIVE UPPER GASTROINTESTINAL
HEMORRHAGE FOLLOWING SURGICAL
PERATIONS.** *(E.)* Goodman, A. A. (U. Michigan Med. Ctr.,
nn Arbor) and C. F. Frey. *Ann. Surg.* 167(2):180-184, 1968.

ommon clinical factors were examined in 24 cases of massive
pper gastrointestinal postoperative hemorrhage to identify
ose important in the ėtiology and pathogenesis of the hemor-
age. The operation most frequently followed by hemorrhage
as resection of aortic aneurysm (6 patients, 100% mortality).
ll had clinical histories of arterial hypotension and severe in-
ection. Episodes of hypotension preceded hemorrhage in 18
f the 24 patients; major infection was present in 20 patients;
nd both occurred in 18 patients. Vagotomy and pyloroplasty
ith ligation of bleeding points reduced the mortality of gas-
rointestinal hemorrhage but produced a high incidence of re-
urrent bleeding. Body subtotal gastric resection patients died.
f the ulcer patients, 7 had duodenal ulcers and 5 had gastro-
uodenal ulcers. Of the total of 24 patients with postoperative
emorrhage, 17 died; of the 11 treated without surgery, 10
ied, indicating the inefficacy of medical management. Early
urgical management offers the only hope of controlling mas-
ive upper gastrointestinal hemorrhage occurring postoperatively.

182 **ASPIRIN AND GASTROINTESTINAL BLEEDING.** *(E.)* Salter, R. H. (Bristol Roy. Infirmary, Bristol, England). *Amer. J. Dig. Dis.* 13(1):38-59, 1968.

The association of aspirin with occult gastrointestinal bleeding was first presented by Lange, studying the effects of 5 different salicylate compounds. Enteric-coated aspirin caused the least bleeding. Stubbe, finding the same effects in normal and rheumatic patients, postulated an irritative effect of aspirin on the gastric mucosa. Although blood loss was small, it was judged sufficient to cause iron-deficiency anemia, particularly if aspirin ingestion was habitual. The Na-chromate (^{51}Cr)-labeled-RBC method proved a more reliable technique in studying occult bleeding because it could detect the presence and amount of occult bleeding. Conclusions drawn from studies using this method are that aspirin, in therapeutic doses, induces occult bleeding in the gastrointestinal tract in 70% of subjects, with a daily blood loss of 5 ml. The incidence was not reduced by using rapidly dispersible preparations. Although effervescence reduces the incidence, the high percentage of alkali incorporated in effervescent preparations makes them inappropriate for long-term use. Enteric coatings also reduce occult bleeding. The association of aspirin with overt gastrointestinal bleeding was first reported by Muir and Cossar, who found that 45% of 157 patients admitted with gastrointestinal bleeding from ulcers had taken aspirin within 24 hr of the attack. Gastroscopy revealed hyperemia and submucosal hemorrhage in areas where aspirin adhered to stomach mucosa after ingestion. Administration of aspirin prior to gastrectomy produced ulceration and mucosal hyperemia. The mechanisms involved in the production of aspirin-induced mucosal lesions have not been elucidated. Augmented acid secretion and increased hemorrhagic tendency do not seem important but the relative significance of impaired mucosal production, mucosal damage after histamine liberation, increased acid diffusion, and increased exfoliation of gastric mucosal cells remain to be assessed. It also remains to be seen whether the aspirin molecule must penetrate the mucosal cell before lesions are produced.

183 **CLINICAL AND EPIDEMIOLOGICAL ASPECTS OF BILHARZIASIS DUE TO *SCHISTOSOMA INTERCALATUM* IN GABON.** *(Fr.)* Deschiens, R. (Gabon Natl. Lab. Public Health, Libreville) and A. Poirier. *Bull. Soc. Path. Exot.* 60(3):228-240, 1967.

An epidemiological study of bilharziasis due to *Schistosoma intercalatum* revealed an infestation rate of 18% among the adult population of Libreville, Gabon (101 positive stools among 561 examined); among 277 school children the infestation rate was 6-23%, depending mainly on the school. The principal vectors were mollusks of the species *Bulinus (Pyrgophysa) forskalii* Ehrenberg, among which the infestation rate is about 36%. The clinical effects of *S. intercalatum* infestation were found to be quite severe, probably due to the large numbers of parasites resulting in polypoid involvement of the large intestine, liver, and sometimes the adnexae. Good therapeutic results were obtained in 40 cases with nitrothiamidazole (Bilharstan; 20-25 mg/kg/day for 4-7 days), although relapses could not always be avoided. Eradication of the focus of infestation at Libreville is recommended by means of prophylactic measures including treatment of carriers, destruction of mollusks, and health education.

GENERAL

184 **CHANGING AND CONTROVERSIAL CONCEPTS REGARDING INTRAVENOUS SALT ADMINISTRATION FOLLOWING GASTROINTESTINAL SURGERY.** *(E.)* Cooper, D. R. (Woman's Med. Coll. Philadelphia, Pa.). *Amer. J. Gastroent.* 48(5):410-420, 1967.

Renal conservation of Na^+, Cl^-, H_2O, and increased excretion of K^+ and N following surgery are well documented. Anterior and posterior pituitary and adrenal secretion rates are increased, but the exact mechanisms involved or specific cause-and-effect relationships have not been established. Based on triple isotope studies, Shires postulated an internal shift of body fluids following hemorrhagic shock in dogs, and gave evidence for transfer or redistribution of extracellular fluid to the intracellular compartment. After reinfusion of the shed blood, plasma volume remained 28% below control values. Dillon and associates obtained better results by reinfusing one-half the shed blood with lactated Ringer's solution, in volumes equal to removed plasma plus four times the removed red cell mass. These results were attributed to replenishment of "functional sodium mass" rather than to extracellular fluid expansion. The results of triple isotope studies of surgical patients were not so clear cut as those of the laboratory studies, but a significant drop in functional extracellular fluid was observed. The deficit was correlated with the degree of trauma rather than with the amount of blood loss. Moore and associates obtained data from human subjects indicating movement of fluid from the extravascular to intravascular space. Experimental differences (subjects, methodology, and degree of hemorrhage) make these procedures difficult to compare. For Virtue and associates, functional extracellular fluid loss was correlated with degree of trauma, and was not proportional to blood loss. Extracellular fluid loss is equally countered by lactated Ringer's solution, 5% glucose, or isotonic saline. Lactated Ringer's solutions seems to be the safest and most effective plasma expander. Maintenance of patient's fluid balance before, during, and after surgery should be based on the patient's individual needs.

185 **SURGICAL ASPECTS OF SALIVARY GLAND DISEASE.** *(E.)* Ulin, A. W. (Hahnemann Med. Coll., Philadelphia, Pa.). *Amer. J. Gastroent.* 48(5):373-381, 1967.

Review of 106 parotid, 67 submaxillary, and 9 accessory salivary gland resections reveals that the diagnostic problems of salivary gland disease are related to the high incidence of carcinoma in tumors, involvement of the parotid in systemic diseases (e.g., lymphoma, tuberculosis, sarcoidosis and metastatic cancer), and differential diagnosis of Mikulicz-Sjögren disease. Salivary gland enlargement may also be due to various inflammatory conditions, so that definitive diagnosis requires biopsy as well as bacteriological culture studies and antibiotic sensitivity tests. The most common indication for submaxillary resection was chronic inflammatory disease. Of 22 tumors found in parotid resection, 6 were malignant; of 4 tumors found in submaxillary and accessory gland surgery, 2 were malignant. These results compare favorably with those of other studies. The need for safe and adequate salivary gland surgical techniques is stressed. The Stensen duct approach to parotidectomy and Wharton duct approach to submaxillary resection are the most satisfactory now available. Operative procrastination and inadequate tumor removal are causes of poor results in treatment of malignant mixed tumors and salivary gland carcinoma.

186 **DISTURBANCES IN GASTROINTESTINAL MOTILITY IN ORGANIC DISEASE OF THE DIGESTIVE TRACT.** *(Fr.)* Duret, R. L. (St. Pierre Hosp., Brussels, Belgium), P. Mainguet, O. Thys and M. Arguello. *Acta Gastroent. Belg.* 30(10):669-694, 1967.

Following a brief analysis of the different methods used in the clinical investigation of gastrointestinal motility, the literature on gastric, jejunal and small intestinal motility in various diseases is reviewed in detail, with emphasis on the effects of peptic ulcer, gastrectomy, sprue, scleroderma, ulcerative colitis, hypothyroidism, megacolon and Crohn's ileitis. In certain areas, the review is supplemented by a report of personal studies using electromanometry and open-catheter techniques. It is pointed out, for example, that the amplitude and frequency of jejunal peristalsis are decreased in nontropical sprue, hypothyroidism (5 of 7 cases), acquired megacolon (3 of 7 cases), and ulcerative colitis (1 of 3 cases). Patients with sprue also show a decreased pressure gradient between the intestinal lumen and the capillaries, which contributes to malabsorption. In ulcerative colitis the decreased jejunal motility returned to normal after probanthine (rebound effect). On the other hand, jejunal motility is increased in cases of diabetic steatorrhea and Crohn's ileitis. With regard to the motility of the large intestine this was found to be subnormal in 10 of 14 cases of acquired megacolon, only 7 of which showed a positive response to urecholine (5 mg i.m.); furthermore, there was a marked correlation between the results of the urecholine test and the response to therapy. Large intestine motility was also decreased in 14 cases of hypothyroidism, especially in those patients with constipation, in whom the rectal activity was found to be greater than the sigmoid activity (the reverse of the normal). A positive response to urecholine was also associated with the absence of constipation (a symptom which was present in 8 of the 14 cases studied and in 33 of 43 other cases of hypothyroidism). Similar studies on 24 cases of ulcerative colitis revealed severe sigmoid hypomotility, but increased responsiveness to urecholine (except in the most severe and refractory cases). The hypomotility in ulcerative colitis is therefore not due to true atonia, as in hypothyroidism or megacolon, but to a decrease in the phasic inhibitory activity of the rectum. The point is made that the open-catheter technique for motility studies cannot distinguish between an inactive colon, incapable of propulsive activity, and a colon which is in a state of permanent propulsion. Significant prognostic and differential diagnostic information, however, can be obtained by means of the urecholine test.

187 **CASE REPORTS AND DISCUSSION OF THE PATHOGENETIC RELATIONSHIPS BETWEEN DUODENO-COLIC DIVERTICULOSIS, HIATUS HERNIA AN CHOLELITHIASIS AS SEEN IN THE SO-CALLED TRIAD OF SAINT.** *(It.)* Asole, F. (Inst. Spec. Surg. Path., Catholic U. Sacred Heart, Rome, Italy) and E. Locatelli. *Chir. Gastroen* 1(3):360-377, 1967.

On the basis of two personal observations (women, 70-71 yr old) and a detailed review of the literature, it is concluded that the diverticulosis and hiatal hernia of Saint's triad may be etiologically related (based on congenital motor dysfunction of the digestive tract), but that the concomitant cholelithiasis is a coincidental finding related to constitutional factors.

GENERAL

188 **PHYSIOLOGIC RESPONSES TO GASTRIC ACID HYPERSECRETION IN ZOLLINGER-ELLISON SYNDROME.** *(E.)* Cook, H. B. (U. Michigan Med. Ctr., Ann Arbor) and A. B. French. *Amer. J. Dig. Dis.* 13(3): 191-203, 1968.

Two patients with intact stomachs and gastric acid hypersecretion had diarrhea and steatorrhea. In a 49-yr-old man with jejunal peptic ulceration and repeated gastrointestinal hemorrhages, the pH levels at the duodenoflexure following a test meal were normal (6.25-7.05 after 0-70 min) and pancreatic exocrine function measured by bicarbonate secretion appeared normal. Tryptic activity of intestinal aspirates after a meal was almost normal (mean 8.8 μEq/min/ml in 90 min). Diarrhea but not steatorrhea was controlled by belladonna at maximum tolerated doses. At total gastrectomy islet-cell hyperplasia without pancreatic tumor was seen. In the second patient, a 41-yr-old man, intraduodenal pH levels temporarily rose to 5.7 in the first 30 min after the test meal but then decreased to less than 2.0 for the remainder of the 120 min period. Tryptic activity rose to 5.0 after 30 min and then fell below 2. In this patient, multiple pancreatic islet-cell adenomas showing histologic evidence of malignancy were found; one tumor was proven to be "gastrin-secreting." In both patients, administration of hexamethonium with atropine temporarily suppressed spontaneous gastric acid secretion.

189 **GASTRIC, HAEMATOLOGICAL, AND IMMUNOLOGICAL ABNORMALITIES IN HASHIMOTO'S THYROIDITIS.** *(E.)* Schiller, K. F. R. (St. Peter's Hosp., Chertsey, Surrey, England), L. M. Snyder and M. B. Vallotton. *Gut* 8(6):582-587, 1967.

A study of gastric hematological and immunological abnormalities was made in 18 female patients (ages 17-60 yr; mean 41.4) with Hashimoto's thyroiditis. Antibodies to intrinsic factor, thyroglobulin, colloidal antigen, and cytoplasmic antigen were determined by indirect immunofluorescence. Minor abnormalities of hematocrit and serum vitamin B_{12} levels were common. Vitamin B_{12} absorption, measured by the Schilling test in 15 patients, was normal in all. Of 17 patients who underwent augmented histamine tests, 9 showed hypochlorhydria; none had achlorhydria. Patients with Hashimoto's thyroiditis showed lower mean intrinsic factor production and concentration than a comparison group of 10 male patients with duodenal ulcer. None of the Hashimoto's thyroiditis patients had antibodies to serum intrinsic factor. Significant titers of thyroid antibodies were found in 16 patients; 4 had gastric parietal cell antibodies. Reduced gastric acidity and intrinsic factor production are common in Hashimoto's thyroiditis patients, especially those with gastric parietal cell antibodies. Whether all the patients are equally susceptible to gastric secretory hypofunction is not yet known.

190 **PATHOPHYSIOLOGY AND PATHOGENESIS OF HEPATOSPLENIC SCHISTOSOMIASIS MANSONI.** *(E.)* Warren, K. S. (Western Reserve U. Sch. Med., Cleveland, Ohio). *Bull. N.Y. Acad. Med.* 44(3):280-294, 1968.

The animal model of hepatosplenic schistosomiasis was compared pathologically and physiologically to the disease seen in man. The animal model (mainly in mice) has demonstrated that the schistosome egg is the parasite factor essential for the occurrence of the overt disease manifested by portal hypertension without chronic liver disease. The role of the granulomatous response of the host to the parasite was discussed; the etiology of the granuloma reaction appears to be an immunological delayed hypersensitivity process. A comparative study in mice, rats, gerbils and hamsters with various granulomatous reactions showed that portal hypertension was most severe in the animals with the most severe granulomatous response. Immunological or pharmacological suppression of the granuloma formation around the schistosome eggs is suggested as a means of preventing the overt disease in spite of heavy and uncontrolled infection by the parasite.

191 **EXTRAPERITONEAL PERFORATIONS OF THE GASTROINTESTINAL TRACT.** *(E.)* Hill, M. C. (U. California Sch. Med., San Francisco), W. P. Bieber, R. L. Koch and W. Coulson. *Amer. J. Roentgen.* 101(2):315-321, 1967.

Extraperitoneal perforations of the gastrointestinal tract, which may be fatal if not recognized, were illustrated by 5 case histories. The site of the perforation was in the colon in 3 cases. cases. In all cases one or more of the following roentgenographic signs were seen: extraperitoneal gas, obliteration of normal extraperitoneal fat lines, and abnormal position of the nasogastric tube. In one case a perforated solitary diverticulum may have been the cause, in another case an ingested foreign body was suspected. The other perforations were caused by carcinoma, peptic ulcer, and trauma, resp.

192 **MANSON'S SCHISTOSOMIASIS IN PUERTO RICO: CLINICAL ANALYSIS OF 1,845 UNTREATED PATIENTS.** *(E.)* Ramos-Morales, F. (U. Puerto Rico Med. Sch., San Juan), Z. R. Sotomayor, R. S. Diaz-Rivera and R. Correa-Coronas. *Bull. N.Y. Acad. Med.* 44(3):317-331, 1968.

Among 2,546 patients with Manson's schistosomiasis who have been studied, 1,845 are untreated. In this untreated group, male to female ratio was 3:1. Most of the patients (76.2%) were 15 yr of age or younger. Most patients gave a history of repeated exposure to contaminated waters. About 24.7% of the patients were asymptomatic, while the remaining patients presented with abdominal distress, anorexia and weakness. Physical examination revealed hepatomegaly in 34.2% and splenomegaly in 12.1% of the cases. In 14 patients portal hypertension with esophageal varices (determined by esophagrams) was found. Laboratory findings included hemoglobin values below 13 g% in 57.8%, increased sedimentation rate in 46.6%, leukocytosis in 25%, eosinophilia in 55.5%, and serum hypergammaglobulinemia in 45.4%. A positive complement fixation test and a circumoval precipitation test occurred in 93.3% and 82.4%, resp. Hepatic function was usually normal. The disease was self-limiting in 21 patients.

GENERAL

193 **PROTEIN DIGESTION IN DUODENO-BILIARY DYSKINESIA.** *(E.)* Grabowski, T. (Med. Dept., 2nd Central Clinical Hosp., W.A.M., Warsaw). *Acta Gastroent. Belg.* 30(8-9):608-614, 1967.

Pancreatic secretion and the motility of the upper digestive and biliary tracts are both neurally and hormonally controlled. To determine whether pancreatic secretion disturbances accompany duodeno-biliary dyskinesia, the gelatine digestion test (blood proline level after ingestion of 1.5 g/kg of gelatine in 15% water soln.) was conducted on 36 patients with duodeno-biliary dyskinesia and 15 healthy controls. Fasting, the blood proline level was similar in patients and in healthy controls, but 2½ hr after gelatine ingestion, the blood proline was significantly lower in the patients. Repetition of the test in 11 patients showed the low blood proline to be due to a deficit of proteolytic enzyme rather than to malabsorption. The association of impaired pancreatic secretion with duodeno-biliary dyskinesia may be due to failure of coordination of the neuronal and hormonal mechanisms governing both.

194 **THE ECOLOGY OF SCHISTOSOMA IN PUERTO RICO.** *(E.)* Ferguson, F. F. (U. S. Dept. HEW, San Juan, Puerto Rico). *Bull. N.Y. Acad. Med.* 44(3):231-244, 1968.

Reviewed are the various factors which contribute to the ecology of schistosomiasis in Puerto Rico. The disease is relatively mild with most infections presenting sporadic gastrointestinal symptoms. It is believed that a high protein diet has been beneficial. The prevalence of the disease based upon fecal sampling was found to be 15%, while a skin test survey of fifth grade children showed a 12% prevalence. The disease is unevenly distributed and is found both in rural and suburban communities as well as in mountain and plain provinces. Most infections first occur when Puerto Rican children play in contaminated water which allows the cercariae to penetrate the buccal mucosa. Control measures are ineffective and still are largely experimental. The author noted that further research should be centered on the control of the miracidium and cercaria stages of the life cycle and on studying the warm-blooded carriers of *Schistosoma mansoni.*

195 **THE ZOLLINGER-ELLISON SYNDROME.** *(E.)* Hallenbeck, G. A. (Mayo Clinic, Rochester, Minn.). *Gastroenterology* 54(3):426-433, 1968.

A discussion is presented of the pathophysiology, clinical features, diagnosis, and treatment of the Zollinger-Ellison syndrome, defined by the author as the combination of pancreatic islet cell tumor and gastric hypersecretion, usually with peptic ulceration, whether or not other endocrine tumors are manifest. While the magnitude of gastric hypersecretion is due in large part to continuous stimulation of the parietal cells by the gastrin-like substance secreted by the tumors, the unusually large parietal cell population found in these patients also contributes to this hypersecretion. Important features for the preoperative diagnosis depends on recognition of peptic ulceration which does not respond to the usual medical or surgical treatment and on the presence of chronic diarrhea. Management often involves the unusual situation in which a target organ (the stomach) is removed while the tumor remains.

196 **INFLUENCE OF GASTRIC pH ON GASTRIC AND JEJUNAL FLORA.** *(E.)* Gray, J. D. A. (Central Middlesex Hosp., London, England) and M. Shiner. *Gut* 8(6):574-581, 1967.

The *in vivo* influence of gastric juice pH on gastric and jejunal flora was studied in 33 fasting adults, aged 21-73 yr, with various gastrointestinal conditions (10 with previous peptic ulcer operations, 7 with idiopathic steatorrhea, 8 with treated and untreated pernicious anemia, and 8 with miscellaneous disorders). Each subject underwent either the full-augmented, modified-augmented, or submaximal histamine test and the pH of subsequent gastric secretions was measured. According to pH values, the subjects were divided into 2 groups, those with pH below 5.0 (16) and those with pH above 5.0 (17). In 11 of the 16 with pH below 5.0, the gastric juice was sterile on culture and when organisms did grow, the growth was scanty. The jejunal juice was cultured in 12 cases and 7 of these samples were sterile; in the remaining 5 samples numerous intestinal organsms developed. Of the 17 patients with gastric juice with pH above 5.0, only 5 were sterile. In the remaining 12, throat commensals were found in 2, and the other 10 showed heavy fecal organism growth as well. The jejunal juices of 13 were cultured: 5 were sterile, 1 showed throat commensals only, and the other 7 showed heavy fecal organism growth with and without throat commensals. Histopathological abnormalities of gastric and jejunal mucosa did not correlate with bacterial growth. Significant growths of coliform bacilli were seen in cultures of the gastric juice and jejunal contents of 6 of 10 patients with partial gastrectomy or gastroenterostomy and 4 of 8 with pernicious anemia.

197 **GASTROINTESTINAL HAEMORRHAGE IN INTRACRANIAL OPERATIONS.** *(E.)* Ramamurthi, B. (Govt. Gen. Hosp., Madras, India) and T. S. Kanaka. *J. Indian Med. Ass.* 49(12):574-576, 1967.

Following 1074 intracranial operations, 3 patients developed fatal gastric ulceration and intragastric hemorrhage. The patients developed hematemesis postoperatively and expired; the exact cause of the complication is unknown. Although gastrointestinal complications can follow surgery on any part of the brain, chronic neurological disorders, not just surgical intervention, can lead to gastrointestinal disturbances. Hypothalamic lesions can cause acute gastric ulceration in experimental animals. Neural connections and influences within the brain are so widespread, it is difficult to pinpoint the area responsible for this complication to neurological surgery.

198 **EXPERIMENTAL STUDIES ON AUTOIMMUNE PHENOMENA IN INTESTINAL DISEASES: ENTEROPATHY PRODUCED BY HETEROLOGOUS IMMUNE SERUM.** *(Fr.)* Fodor, O. (3rd Med. Clin., Cluj, Romania), D. Dumitrascu, I. Caluser, R. Iencica and N. Parau. *Acta Gastroent. Belg.* 30(8-9):615-630, 1967.

Antisera against guinea pig small intestine were prepared by injecting homogenates of either the intact intestinal wall or the isolated mucosa i.m. into rabbits every 3 days for 3 weeks;

these antisera were then used (at a dose of either 1 ml every 3 days for 5 days or, in the case of the mucosal preparation alone, a single injection of 5 ml) to treat guinea pigs whose jejunum, ileum, colon, liver, spleen and mesenteric lymph nodes were subjected to histological examination from 1 day to 6 months after the last injection. Following administration of antiserum against the intact intestinal wall, the small intestine showed transitory congestion and edema followed by marked phagocytic and lymphoplasmocytic infiltration, pyroninophilia and proliferation of the intestinal follicles. Similar changes were seen in the spleen and lymph nodes, but the other organs were essentially normal. These organ-specific changes in the small intestine regressed in 3-6 months, indicating their probable dependence on the autoimmune reaction. With the anti-mucosal antiserum, the intestinal alterations were similar and often more marked, although the initial congestion and edema were produced only by a single massive dose (which did not result in proliferation of the intestinal follicles). The changes were also similar in one group in which a single massive dose of anti-mucosal antiserum was combined with *Escherichia coli*, suggesting that the effect of the intestinal mucosa may actually be due to bacterial proteins. On the basis of these results, it is suggested that chronic enteritis may involve autoimmune phenomena.

199 **SURGICAL MANAGEMENT OF ENTEROCUTANEOUS FISTULA OF THE SMALL INTESTINE AND COLON.** *(E.)* Segar, R. J. (Temple U. Med. Ctr., Philadelphia, Pa.), H. E. Bacon and A. R. Gennaro. *Dis. Colon Rectum* 11(1):69-73, 1968.

Enterocutaneous fistulas, appearing as suture abscesses or wound infections, were diagnosed in 11 patients, aged 28 to 66 yr, who had undergone previous operations for various gastrointestinal ailments. Contrast fistulography and roentgenograms of the small and large bowel were used in diagnosis. Preoperative preparations included correction of fluid and electrolyte deficiencies; correction of skin lesions by opening and draining abscesses; and preparation of the bowel by purges and enemas for 2 days prior to surgery. Cure of patients often required intestinal resection and complete excision of the fistulous tract and skin adjacent to the cutaneous opening. Internal openings were in the small intestine in 2 patients; in the colon or rectum in 3 patients; and in the small intestine and colon or rectum in 6 patients. Emphasis is placed on treating intra-abdominal conditions that would prevent proper healing of wound after fistula resection; on removing any distal obstruction or foreign body situated at the fistula site; draining abscesses; controlling any gastrointestinal inflammation; and excluding unresectable neoplasms. Complications occurred in 3 cases. One patient developed serum hepatitis which responded to therapy; another developed small bowel obstruction which was corrected by resection and anastomosis. The only death was caused by complete disruption of ileorectal anastomosis and insuperable peritoneal contamination. Failure of anastomosis to heal was attributed to prolonged steroid therapy used to treat the patient's arthritis.

200 **REPORT OF TEN PERSONAL CASES OF INTESTINAL INVAGINATION IN THE ADULT.** *(Fr.)* Adloff, M. (U. Hosp., Strasbourg, France), L. F. Hollender, G. Copin and A. G. Weiss. *Arch. Mal. Appar. Dig.* 56(11):1109-1116, 1967.

The clinical characteristics, etiology and treatment of intestinal invagination are discussed on the basis of the literature and 10 cases (6 men and 4 women, 24-76 yr old) treated during the past few yr and representing 1.5% of all obstructions seen during the period. The 10 cases included 5 with an ileo-ileal invagination (3 due to tumors, one due to hypertrophy of a Peyer's patch, and one apparently spontaneous following an accident), 2 with an ileo-cecal invagination (one due to cancer and one primary), 2 with ceco-colic invaginations due to tumors, and one patient with a colo-colic invagination due to a submucous lipoma. It is pointed out that the possibility of an acute cause should be kept in mind even in the adult, even though the condition is most likely to be chronic and even though the invagination is secondary to an organic lesion in over 80% of the cases. The most common form is ileo-ileal, and the most common causes are mechanical (such as the wt of a tumor) or hyperperistalsis from neuroautonomic stimulation. The only suitable treatment is surgical, but correction of the invagination should always be attempted before resection is resorted to, even in the colon, since the underlying lesion may be benign.

201 **EFFECTIVE TREATMENT OF THE DIARRHEA OF CHOLERRHEIC ENTEROPATHY WITH CHOLESTYRAMINE.** *(E.)* Poley, J. R. (Rochester, Minn.) and A. F. Hofmann. *J. Lab. Clin. Med.* 70(6):1024-1025, 1967.

202 **CONTROL OF TENESMUS AND DIARRHEA BY CHOLESTYRAMINE ADMINISTRATION.** *(E.)* Rowe, G. G. (U. Wisconsin Med. Sch., Madison). *Gastroenterology* 53(6):1006, 1967.

203 **HEPATIC AMEBIASIS IN CZECHOSLOVAKIA.** *(Cz.)* Melichar, F. (Med. Fac. Purkynje U., Brno, Czechoslovakia). *Vnitrni Lek.* 13(12):1204-1206, 1967.

204 **COMPLICATIONS CAUSED BY *SCHISTOSOMA HAEMATOBIUM* IN THE FORM OF APPENDICITIS, HEPATOSPLENOMEGALY, AND ASCITES.** *(Fr.)* Leszek, W. (Dogondoutchi Med. Ctr., Nigeria) and T. Witon. *Med. Afr. Noire* 15(1):29-31, 1968.

205 **THE SYNDROME OF PORTOPULMONARY SCHISTOSOMIASIS.** *(E.)* Macieira-Coelho, E. (Inst. High. Educ., Fac. Med., Lisbon, Portugal) and C. S. Duarte. *Amer. J. Med.* 43(6):944-950, 1967.

206 **AMOEBIC LIVER ABSCESS: SOME UNIQUE PRESENTATIONS. [FOUR CASES]** *(E.)* Rab, S. M. (Dacca Med. Coll., Dacca, Pakistan), N. Alam, A. N. Hoda and A. Yee. *Amer. J. Med.* 43(5):811-816, 1967.

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261 REPORT ON 115 CASES OF ESOPHAGEAL-GASTRIC RESECTIONS INVOLVING GASTRIC FUNDUS AND CARDIA TUMORS. *(It.)* Catania, V. C. (Nat. Inst. Tumor Study & Cure, Milan, Italy), B. Salvadori, G. Ravasi, G. Valentinis. *Chir. Ital.* 18(6):1027-1034, 1966.

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262 COMBINED RADIATION AND SURGERY TO TREAT CARCINOMA OF THE ESOPHAGUS.

(E.) Nealon, T. F. (Jefferson Med. Coll. Hosp., Philadelphia, Pa.) and R. C. Camishion. *Amer. J. Gastroent.* 48(5):380-391, 1967.

Combined radiological and surgical treatment of esophageal carcinoma is proposed, to consist of radiotherapy (^{60}Co, 6000 r) followed in 6 weeks by construction of a right colon substernal bypass and 6 weeks after that by transthoracic total esophagectomy. The drawbacks of right colon bypass (ileocolostomy, difficulty of anastomosis) are accepted to avoid the more serious drawbacks of left colon bypass (reverse peristalsis, aspiration pneumonia). The 2-stage procedure is preferred as reducing the concentration of surgical trauma to already debilitated patients. The advantage of combining radiation with surgery is that the temporary arrest of tumor growth which radiation affords will last until the tumor is removed. Removal of the entire esophagus insures against recurrence, of which incidence is high (45%) in subtotal resections. Limited experience (3 patients) already shows far higher survival than that accomplished by other techniques and warrants further trial.

263 ALTERATIONS IN MOTILITY OF THE ESOPHAGUS IN PEPTIC ESOPHAGITIS. *(E.)*

Ramirez, J. D., V. Guarner and F. Pazmino. *Amer. J. Proctology* 19(1):67-73, 1968.

Esophageal motility (based on intraluminal pressure) was determined and a simultaneous respiration pneumogram made in 18 hiatus hernia and peptic esophagitis patients and 7 healthy controls. Eight of the patients showed normal peristalsis. Weak contractions (decreased amplitude and spontaneous contractions) were found in 8 more with endoscopically confirmed light (2 patients), moderate (2 patients), and intense (4 patients) esophagitis. Peristalsis was absent in the remaining 2 patients (severe esophagitis). These motility changes were confined to the lower third of the esophagus. In 5 of the 7 healthy subjects motility was normal in all segments; 2 showed weak contractions and spontaneous contractions in the lower esophagus. Biphasic respiration was observed in hiatus hernia without stenosis or shortened esophagus. Esophageal motor dysfunction in esophagitis is apparently related to the severity of the disease.

264 SELECTIVE DECOMPRESSION OF ESOPHAGOGASTRIC VARICES. *(E.)*

Teixeira, E. D. (Sch. Med. Surg., Rio de Janeiro, Brazil), H. Yu, J. Conn, Jr. and J. J. Bergan. *Arch. Surg.* 96(1):4-8, 1968.

A new operation, designed to prevent variceal hemorrhage by decompressing esophageal varices, thereby avoiding the reduction of hepatic blood flow and resultant encephalopathy which accompanies portacaval shunt is proposed. Preliminary studies have been made in dogs, cadaver dissections, and dissections of monkeys. Basically the new procedure consists of splenocaval shunting with gastrosplenic portal disconnection, which diverts esophagogastric venous blood from the portal circuit into the systemic circulation without affecting intestinal and portal vein flow. The adequacy of decompression by this method and the physiologic function of the anastomosis was demonstrated by experiments in anesthetized dogs, some of which were subjected to occlusion of the portal vein (acute portal hypertension). In the human, a central side-to-side splenorenal anastomosis is also possible; combined with ligation of the splenic vein where it joins the mesenteric vein, this is suggested as an alternative procedure.

265 LATE RESULTS OF THE TREATMENT OF HIATAL HERNIA: AN ANALYSIS OF 200 CASES.

(E.) Silber, W. (Dept. Surg., U. Cape Town, South Africa). *Amer. J. Dig. Dis.* 13(3):252-259, 1968.

The study group represents 200 unselected consecutive patients with hiatal hernia seen from 1957 to 1960 in the esophageal clinic. As to types, 184 were sliding hiatal hernias, 7 were paraesophageal, and 9 were composite hiatal hernias. Female to male ratio was 2:1. Highest incidence was in the white group; there were no cases among Bantus and none in Cape Colored who were past age 70 yr. Most patients were treated conservatively: 171 (162 sliding hiatal, 9 composite hiatal hernia). Surgical treatment was used for 29: 17 because of associated pathology, and 12 because of the hernia itself. In the series as a whole, the incidence of complications was low. Management of those with sliding hiatal hernias depends on the adequancy of the inferior esophageal sphincter. In those with an adequate sphincter, initial conservative treatment is directed towards reducing the "bag" in the mediastinum by reducing flatulence and modifying the diet to prevent overdistension of the stomach and induce weight reduction. In the larger group with an inadequate esophageal sphincter, conservatism is again essential. Additional elements in the treatment of these patients is an ambulant ulcer diet, elevation of the head of the bed, and administration of certain drugs (antacids and antispasmodics). When surgery was necessary, transabdominal herniorrhaphy in association with Nissen's fundoplication was employed.

266 VULNERABILITY OF VARIOUS LEVELS OF THE ESOPHAGUS TO PEPTIC DIGESTION.

(E.) Barnes, W. A. (New York Hosp., Cornell U. Med. Ctr., New York, N. Y.), S. F. Redo and L. Schwartz. *Amer. J. Surg.* 115(3):276-278, 1968.

In a study on 23 dogs, the esophagus was perfused for 3.5-7 hr with 2% pepsin solution adjusted to a pH of less than 2 by three techniques. Fifteen dogs were subjected to triple perfusion with suitable catheters inserted into the upper, middle, and lower thirds of the esophagus. In 5 dogs a single perfusion was performed through a catheter inserted through the mouth into the upper part of the esophagus with the animal in the reverse Trendelenberg position. Reverse perfusion was carried out in 3 dogs in the Trendelenberg position. Evaluation of injury to the various segments of the esophagus revealed that all levels appeared to be equally vulnerable to acid pepsin digestion.

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Blakemore, W. S. and M. Nusbaum. Pp. 283-287 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson (Eds.) New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

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275 SUSCEPTIBILITY OF VARIOUS LEVELS OF ESOPHAGUS TO PEPTIC DIGESTION. *(E.)* Barnes, W. A. (New York Hosp.-Cornell U. Med. Ctr.), S. F. Redo and L. Schwartz. *New York J. Med.* 68(5):645, 1968.

276 ESOPHAGEAL CARCINOMA. *(E.)* Nevile, W. E. (Vet. Admin. Hosp., Hines, Ill.). *New York State J. Med.* 68(5):649-655, 1968.

277 REPLACEMENT OF HYPOPHARYNX AND ESOPHAGUS. *(E.)* Balasegaram, M. (Gen. Hosp., Seremban, Malaysia). *Amer. J. Surg.* 115(3):279-286, 1968.

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STOMACH

(Gastric ulcer is placed with peptic ulcer)

289 **SOURCE OF THE HISTAMINE RELEASED DURING DAMAGE TO THE GASTRIC MUCOSA Y ACETIC ACID.** *(E.)* Johnson, L. R. (Dept. Physiol., U. lich., Ann Arbor, Mich.) *Gastroenterology* 54(1):8-15, 1968.

n investigation of the source of the histamine released from he stomach during damage is performed on male rats weighing etween 200 and 400 g. The stomachs of these rats were ligated t the pylorus and injected with 154 mM NaCl or 100 mM cetic acid plus 54 mM NaCl. At 15-min intervals up to 2 hr he stomach content was removed and its histamine content vas determined by bioassay on the guinea pig ileum. Significant amounts of histamine were released into the gastric conents; release was complete after 30 min of exposure. Homognates made from the rat stomachs were centrifuged and the upernatant fluid was treated as a preparation of histidine dearboxylase. The measured activity of this enzyme was exressed as "histamine-forming capacity" (HFC). Histamine ormation, determined in the presence of various quantities of istidine, was directly proportional to incubation time and the mount of enzyme present. Since the highest HFC values were btained when no more histamine was being released, HFC inrease is probably not responsible for the histamine released nto the lumen. Rats were treated with the mast cell histamine lepletor (compound 48/80) and their stomachs were injected vith NaCl or acetic acid. Since the releasable histamine pool s exhausted within 30 min, and 48/80 prevents histamine reease, it must be the case that the mucosal mast cells are the ource of the histamine, to account for the high HFC observed fter release is complete.

290 **EXCRETION OF BLOOD GROUP SUBSTANCES IN THE GASTRIC CONTENTS OF PATIENTS VITH CARCINOMA OF THE STOMACH.** *(Pol.)* Machalski, M. 1st Intern. Dis., Clin. Silesian Acad. Med., Krakow, Poland), Z. Kalina and J. Wodniecki. *Pol. Arch. Med. Wewn.* 39(6):769-73, 1967.

tudies of the saliva in 196 patients operated on for carcinoma f the stomach revealed that 178 (90.8%) were "secretors". ince the incidence of secretors in a general sample of the Polish opulation was 80.1%, this represents a significant increase in the ercentage of secretors among patients with stomach cancer. The ncrease was particularly marked for blood groups O and B 93.2% to 94.2% secretors among cancer patients and 74.8% to 3.6% among controls); there was no increase in blood group AB. Further studies showed a trend to higher incidence of blood group A and lower incidence of blood group O among cancer patients (especially in nonsecretors) than among controls, and a igher incidence of cancer of the preduodenal region in patients with blood group A.

291 **STUDIES ON GASTRIC ACIDITY DURING TRAVEL IN THE TROPICS.** *(Ger.)* Jungmann, H. 2nd Med. Clin. & Polyclin., Hamburg-Eppendorf U., Germany) and J. Witte. *Med. Klin.* 63(5):173-175, 1968.

Serial determinations of gastric acidity by means of the colorimetric "Gastracid-Test" in 14 Europeans traveling in Central Africa, all of whom showed free HCl before the start of the trip, revealed an increasing incidence of hypochlorhydria and achlorhydria, plus attacks of idiopathic diarrhea, after 10 days at midday temperatures equivalent to 50C or higher. Both the diarrhea and the hypoacidity appeared intermittently in various subjects over the course of several months. The syndrome is ascribed to percutaneous loss of NaCl in the sweat.

292 **BENIGN AND SEMI-MALIGNANT TUMORS OF THE STOMACH.** *(Ger.)* Gregl, A. (Surg. Clin., U. Gottingen, Germany), H. Niemann, J. Schlachetzki, M. Schulze-Niehoff and M. Eydt. *Chirug* 39(1):19-22, 1968.

The incidence, symptoms, radiological and clinical diagnosis, localization and malignant degeneration of benign gastric tumors are discussed on the basis of personal experience and a review of the literature. The incidence of benign gastric tumors varied from 1.2% (7 cases) among 560 stomach operations performed in 1951-58 to 1.39% (155 cases) among 11,111 autopsies performed in 1961, and 2.8-4.3% in male and female material, respectively, sent in to the Institute of Pathology at Gottingen during the period 1954-64. Among 245 cases studied in more detail, the male/female ratio was about 11:10 and most of the patients were in the 50-80 age group; these cases included 101 polyps, 62 neuromas, and 42 myomas. The principal symptoms were apathy and drastic weight loss, but diagnosis is complicated by the fact that there are no truly characteristic radiological or clinical findings. Malignant degeneration was observed mainly in polyps (8 of 48 evaluated), and was independent of the size of the tumor; there was no such degeneration among 8 cases of myoma.

293 **GASTRIC TERATOMA.** *(E.)* Meadow, S. R. (Guy's Hosp., London, S.E. 1, England). *Postgrad. Med. J.* 44(508):183-185, 1968.

A case is presented of a rare gastric teratoma in an infant which was so large that it caused difficulty in delivery. There was respiratory distress and cyanosis immediately after birth which necessitated operation. This report brings to 12 the number of such teratomas reported in the world literature; all were in boys. It usually presents with abdominal swelling or the finding of an abdominal mass (10 cases) which may be noticed at birth (3 cases).

294 **REVERSAL OF NON-ADDISONIAN ACHLORHYDRIA BY A ROUX-EN-Y LOOP.** *(E.)* Capper, W. M. (Southmead and Frenchay Hosps., Bristol, England), T. J. Butler and J. O. Kilby. *Gut* 8(6):612-613, 1967.

A diagnosis of hypochlorhydria due to atrophic gastritis associated with duodenal regurgitation was made in a female patient, aged 57 yr. Regurgitation was surgically corrected by a Roux-en-Y procedure and acid values returned to normal. Hypochlorhydria produced by duodenal regurgitation is attributed to the development of atrophic gastritis and the disturbance of the electrochemical barrier at the surface of residual parietal cells.

295 **CYTOLOGIC AND HISTOLOGIC ALTERATIONS INDUCED BY GASTRIC FREEZING IN DOGS.** *(E.)* Klavins, J. V. (Brooklyn-Cumberland Med. Ctr., New York

City), W. W. Shingleton and R. L. Euson. *Acta Cytol.* 12(1): 18-24, 1968.

The stomachs of mongrel dogs were perfused with 95% ethanol, and cooled from -18C to -10C for 40-60 min; the animals were killed immediately or at 24 hr, 48 hr, or 72 hr after freezing. Sections of cardia taken along the lesser curvature (up to the duodenum) were histologically and cytologically analyzed. No significant changes were found in dogs killed immediately after freezing. At 24 hr there was spotty mucosal hemorrhage and necrosis and incipient mucosal ulceration. The 48-hr specimens showed gastric mucosal ulceration of varying depth; various types of cells (but not parietal cells) showed regenerative changes. Examination of parietal cells revealed more severe damage than noted in other cell types, but no atypical nuclei. Cell changes resembling those of malignancy were frequent in the mucosa, tunica propria, and the upper muscularis mucosa; the nuclear/cytoplasmic ratio increased greatly. Findings at 72 hr resembled those of 43 hr, except for greater hemorrhage organization and continued mucosal regeneration. Cytological imprints suggest the following types of gastric lesion due to freezing: necrosis and hemorrhage in the mucosa immediately after freezing (shown by the presence of erythrocytes and necrotic cells); mucosal cell necrosis with regeneration (presence of atypical and necrotic cells and absence of red blood cells and polymorphonuclear leukocytes); ulcers extending into the muscularis mucosa (presence of atypical cells, necrotic cells, polymorphonuclear leukocytes, and tunica propria and muscularis mucosa cells).

296 **COMPARATIVE STUDIES OF INFILTRATIVE AND ULCERATIVE CANCER OF THE STOMACH.** *(E.)* Yaryura-Tobias, J. A. (U. North Carolina Sch. Med., Chapel Hill). *Amer. J. Dig. Dis.* 13(1):2-7, 1968.

Of 600 cases of stomach cancer diagnosed, 192 were classified as infiltrative and the remainder as ulcerative. Abdominal pain was the most outstanding symptom causing patients to seek medical help. Pain was relieved in 20% of the subjects by eating, vomiting, or taking alkaline substances. Other symptoms were anorexia, vomiting, and weight loss. Palpable masses were found in 19% of infiltrative and 14% of ulcerative cancer patients. Positive diagnosis was confirmed in 83% of infiltrative cancer patients and in 73% of ulcerative tumor patients by roentgenographic studies. No previous history of gastrointestinal disturbance was found in 85% of patients in both groups. Only 10% of all cases were considered inoperable. Ulcerative cancer appeared more in the prepyloric region, and the infiltrative form appeared primarily in the antrum and body of the stomach. Infiltrative tumors were larger, had greater incidence of positive regional nodes, were more invasive, caused more metastases, and had more multiple locations. Recurrence was noted primarily in operative sites; metastasis occurred predominantly in the liver.

297 **PHYSIOPATHOLOGICAL ASPECTS OF THE RESIDUAL GASTRIC SECRETION FOLLOWING GASTRIC RESECTION FOR ULCERS.** *(It.)* Ferri, S. (Inst. Gen. Clin. Med. & Med. Ther., U. Bologna, Italy), P. Azzaroli, E. Figus and R. Di Feliciantonio. *Riv. Gastroent.* 19(1):47-60, 1967.

The gastric secretion in response to histamine hydrochloride (0.025 mg/kg i.m.) was measured in 40 patients who had undergone a Billroth II resection for ulcer at least 6 months before; 28 of these patients had various digestive disorders which could be ascribed to the operation. In all cases, the proteolytic activity of the residual gastric juice was relatively low (a range of 1.6-114 mg tyrosine/ml) and the pH tended to be neutral or alkaline under basal conditions. Free HCl could be detected under basal conditions in only 2 cases (both with digestive disturbances) and after histamine stimulation in only 5 of 12 of those without, and 13 of 28 of those with pathology related to resection. The volume was 28-81 ml during the test period, and 5 of the 28 patients with digestive disorders showed no detectable proteolytic activity under basal conditions. A more detailed analysis of the two groups revealed that the proportion of patients producing free HCl was lower in cases with the dumping syndrome or postprandial diarrhea (5 of 14) than in cases with gastrojejunitis or other digestive syndromes. Furthermore, 12 of 13 patients who produced free HCl after histamine stimulation had severe, rather than moderate, nutritional disturbances (weight loss), compared to only 5 of 15 in whom no free HCl could be detected. The reasons for this apparently paradoxical correlation between the secretion of free HCl and the severity of nutritional disturbances following gastric resection remain unclear.

298 **DIFFERENCES IN LACTATE DEHYDROGENASE ISOENZYME PATTERNS IN VARIOUS PARTS OF THE HUMAN STOMACH AND IN GASTRITIS, PEPTIC ULCER, AND GASTRIC CARCINOMA.** *(E.)* Procházka, B. (Charles U., Prague, Czechoslovakia), V. Jirásek, V. Bárta, J. Kohout, L. Korbová, A. Schlupek and Z. Slezák. *Gastroenterology* 54(1):65-71, 1968.

Gastric tissues obtained from 20 patients during operation (5 for gastric resection for duodenal ulcers, 6 for pyloric ulcers, 3 for fundic ulcers, and 6 for carcinomas) were used to study lactate dehydrogenase (LDH) isoenzyme patterns of diseased gastric mucosa. Also studied was the enzyme activity of surface cells abraded from the mucosa compared with that of total mucosa. Isoenzyme patterns were determined for normal fundic mucosa, fundic mucosa with moderate or extensive atrophic gastritis, pyloric ulcer marginal mucosa, gastric carcinoma tissue, and pyloric mucosa. When unchanged fundic mucosa and mucosa with moderate and extensive gastritis were compared, increases in LDH 4 and LDH 5 and decreases in LDH 1 and LDH 2 were found. The degree of change was related to the decreasing amount of chief and parietal cells and the increasing occurrence of intestinal metaplasia. In diseased pyloric mucosa immediately adjacent to a peptic ulcer, higher LDH 5 and lower LDH 2 percentages were found. A smaller percentage of LDH 1 was found in surface epithelium than in total fundic mucosa; similar differences in isoenzyme patterns were less pronounced in the pyloric mucosa. Variations of LDH isoenzyme patterns observed in pathological material can be explained by changes in cellular populations which are individually characterized by specific ratios of pure tetramers LDH 1:LDH 5 synthesis.

299 **EFFECT OF INTRAVENOUS CALCIUM ADMINISTRATION ON GASTRIC SECRETION OF ACID AND PEPSIN IN MAN.** *(E.)* Smallwood, R. A. (Royal Melbourne Hosp., Australia). *Gut* 8(6):592-598, 1967.

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The relationship between serum calcium levels and gastric secretion was studied in 19 patients (2 normal patients, 13 with duodenal ulcers, 2 with cholelithiasis, 1 with hyperparathyroidism, and 1 with duodenal ulcer and hyperparathyroidism), aged 22-64 yr. Subjects were infused with 4% calcium gluconate for 1 or 2 hr, or were injected i.v. over a period of 5-8 min with 10% calcium gluconate or an equimolar solution of calcium chloride. Gastric secretions were aspirated through a nasogastric tube. Blood pressure and electrocardiographic recordings were taken in subjects receiving the larger amounts of calcium. Serum calcium levels, gastric secretory volume and pH, and pepsin activity were evaluated in all patients. Following calcium infusion, the hourly acid and pepsin output increased; infusion of saline alone increased acid and pepsin output but to lesser degree. Serum calcium levels, elevated 7-8 hr after infusion, were unaffected by saline. Injected calcium raised acid and pepsin secretion; these increases were blocked by atropine. Marked bradycardia with sinus arrhythmia followed i.v. calcium administration and the changes in pulse rate were inversely proportional to the rise and fall in gastric secretion. Vagotomy abolished the secretory response to calcium; the response could not be restored by infusing calcium. These findings indicate that a sharp rise in serum calcium increases gastric secretion primarily by vagal stimulation.

300 **MESENCHYMAL TUMOURS OF THE STOMACH.** *(E.)* Salmela, H. (U. Cent. Hosp. and U. Helsinki, Finland) and G. Tallqvist. *Acta Path. Microbiol. Scand.* 71(1): 8-20, 1967.

Histopathological classification of 176 cases (160 followed for 5 yr) were presented to establish criteria for proper diagnosis and classification of mesenchymal tumors. Review of the listed causes of death in patients dying within 5 yr after diagnosis and surgery revealed that malignant tumors were sometimes mistakenly classified as benign. More than one-half of the cases of cellular leiomyomas had earlier been diagnosed as malignant fusocellular tumors, a finding that did not appear to be justified in the light of the follow-up. Diagnoses should not be made solely on histopathological grounds. The results of this study also support the general opinion that gastric sarcomas have a better prognosis than carcinomas.

301 **ACID DIFFUSION INTO THE HUMAN GASTRIC MUCOSA.** *(E.)* Overholt, B. F. (U. Michigan Hosp., Ann Arbor) and H. M. Pollard. *Gastroenterology* 54(2): 182-189, 1968.

Back diffusion of H^+ ions through the gastric mucosa was studied in 12 normal patients, 10 duodenal and antral ulcer patients, and 8 with gastric ulcer, gastritis, achlorhydria, and hypochlorhydria. Betazole stimulation (1.5 mg/kg) with and without a glycine trap and acid infusion (100 mM HCl) were performed in all patients after a 12-hr fast, and gastric aspirates were collected with a Levin tube. Betazole-glycine stimulated acid secretion was greater than betazole-stimulated secretion. Back diffusion of H^+ ion did not occur during active secretion, but did after acid infusion in gastric ulcer, gastritis, and hypochlorhydria patients; the difference was significant. There was also an increase in stomach lumen Na^+ content. Abnormally permeable gastric mucosa exists, and back diffusion of H^+ ions into the mucosa does occur and may be injurious to the human stomach.

302 **NUTRITIONAL STUDIES IN THE DUMPING SYNDROME: II. EFFECTS OF SECONDARY JEJUNAL TRANSPOSITION.** *(E.)* Hanngren, A. (Dept. Int. Med., Karolinska Hosp., Stockholm, Sweden), S. Hedenstedt and P. Reizenstein. *Amer. J. Dig. Dis.* 12(11):1149-1155, 1967.

Nutritional studies were made in 16 patients (12 men, 4 women) whose severe postcibal symptoms after gastrectomy were improved by secondary jejunal transposition with selective vagotomy. When examined 3-12 months after reoperation, only 2 had postcibal symptoms and these were only moderately severe. Mean weight increase was 3.7 kg; mean hemoglobin increase was 0.6 g/100 ml. Serum iron increased by 0.03 g/100 ml of serum; radio iron absorption decreased by an average of 4.4%, probably because iron deficiency was less marked after reoperation than before. Return to normal vitamin B_{12} absorption in the Billroth I group of patients indicates that deficient absorption was due to dumping rather than to irreversible atrophy of gastric mucosa or intrinsic factor deficiency. Vitamin A and calcium levels were not significantly altered by reoperation.

303 **NUTRITIONAL STUDIES IN THE DUMPING SYNDROME: III. RETENTION OF ORALLY ADMINISTERED ^{47}CALCIUM IN PATIENTS AFTER GASTRECTOMY.** *(E.)* Sjöberg, H. E. (Dept. Int. Med., Karolinska Hosp., Stockholm, Sweden) and R. Reizenstein. *Amer. J. Dig. Dis.* 12(11):1156-1159, 1967.

Nine patients (7 men and 2 women aged 46-78 yr) were studied 5-26 yr after Billroth II partial gastrectomy. Roentgen examination of the skeleton revealed osteopenia (sic) in all but 2 patients. Each patient received 135 mg of $CaCl_2$ (containing 1-2 μC of ^{47}Ca) orally in the fasting stage. Calcium retention measured in a whole body counter 8 and 14 days after administration was significantly increased. The finding of increased calcium retention, suggesting increased absorption, in a condition characterized by intestinal malabsorption, is self-contradictory and is not explained by the present data.

304 **THE ACUTE LOCAL EFFECTS OF PREDNISONE ON THE GASTRIC MUCOSA.** *(E.)* Smith, A. T. (Stanford Med. Ctr., Palo Alto, Calif.), R. Mason and H. Oberhelman, Jr. *Amer. J. Dig. Dis.* 13(1):79-85, 1968.

Twelve fasting male rats, weighing 210-230 g, were sustained on 2.5% dextrose in 0.45% normal saline in a study designed to evaluate the acute direct effect of corticosteroids on the gastric mucosa. A 5 mg prednisone tablet and a placebo was placed on the exposed gastric mucosa of the anesthetized animal, at the junction of the glandular mucosa and forestomach. The tablets remained in place 15 min in 7 rats and 30 min in 5. In the rats exposed for 15 min and 30 min, biopsies were made immediately after the period of exposure and at intervals up to 12 and 24 hr, resp. Gross and microscopic examination of all specimens failed to reveal evidence of acute inflammatory response or ulceration of glandular or forestomach tissue in steroid- or placebo-treated animals.

305 **DESTRUCTION OF THE GASTRIC MUCOSAL BARRIER BY DETERGENTS AND UREA.** *(E.)* Davenport, H. W. (U. Michigan, Ann Arbor). *Gastroenterology* 54(2):175-181, 1968.

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The sodium taurocholate, bile, decyl sulfate, and urea concentrations necessary to destroy lipoprotein layers and hydrogen bonds in the gastric mucosa, and the extent of destruction based on transmucosal Na^+, K^+, and H^+ fluxes, were studied in 4 healthy, unanesthetized Heidenhain pouch dogs, after 18-20 hr fasts. To establish control values, 40 ml of test solution (100 mM HCl and 54 mM NaCl) were placed in the pouch for 30 min and then removed. A detergent or urea solution was then placed in the pouch for 30 min. After removal of the experimental solution, the test solution was again placed in the pouch for 30 min. Natural and synthetic bile salts, 10, 20 and 40 mM in isotonic saline, 40 mM in liquid meal, and 10 mM in acid solution, destroyed the mucosal barrier. The high concentrations of Na^+, K^+, and H^+ in the third pouch wash clearly indicate the destruction of the gastric mucosal barrier.

306 **SARCOMA OF THE STOMACH.** *(E.)* Bazaz-Malik, G. (Maulana Azad Med. Coll., New Delhi, India) and D. N. Gupta. *Amer. J. Gastroent.* 48(6):512-522, 1967.

Of 67 patients with stomach neoplasms, the case reports of 13 with primary sarcomas (8 lymphoma, 4 leiomyosarcoma and 1 neurofibrosarcoma) were presented. Of the 13, 8 were males and 5 females; average age was 41 yr (range 23-55 yr) which was lower than the average age of the other 54 cases with carcinoma. A comparison of the symptoms of the patients with carcinomas (54) and sarcomas (13) were made. The carcinoma patients presented with pain in 42.6% and nausea and vomiting in 50% and with accompanying hemorrhage in only 2 patients. The sarcoma patients presented with abdominal pain referred to the epigastrium and/or hypochondrium in 12 out of 13, while sudden and severe hemorrhage was constantly seen in those with leiomyosarcoma. A statistically significant increase in the incidence of sarcomas was not seen in this survey.

307 **EFFECT OF MEDICAL AND SURGICAL VAGOTOMY ON GASTRIC RESPONSE TO GRADED DOSES OF PENTAGASTRIN AND HISTAMINE.** *(E.)* Konturek, S. J. (1st Dept. Med., Med. Sch., Krakow, Poland), A. Wysocki and J. Oleksy. *Gastroenterology* 54(3): 392-400, 1968.

The gastric secretory response to graded i.v. doses of pentagastrin (pentapeptide) and histamine were studied in three groups of duodenal ulcer patients: I) 22 pretreated with hexamethonium and atropine (medical vagotomy); II) 15 with surgical vagotomy; and III) 11 with both medical and surgical vagotomy. Medical as well as surgical vagotomy lowered the dose response curve at all levels, shifting it to the right. Medical vagotomy resulted in the reduction of HCl secretion to similar degree for histamine and pentagastrin, whereas surgical vagotomy reduced more markedly the response to pentagastrin than to histamine. A strong correlation was shown between the maximal responses to pentagastrin and histamine before and after medical and surgical vagotomy. A significant correlation was demonstrated also between the prevagotomy maximal acid output to both stimulants and the percentage of reduction of HCl secretion to these stimulants induced by medical and surgical vagotomy.

308 **INCIDENCE OF GASTRIC PARIETAL CELL ANTIBODY IN FAMILIES OF PATIENTS WITH IRON-DEFICIENCY ANEMIA.** *(E.)* McFadyen, I. J. (Western Infirmary, Glasgow, Scotland), A. Goldberg, J. H. Dagg and J. R. Anderson. *Clin. Exp. Immunol.* 2(Suppl.):737-741, 1967.

Of 22 patients with iron-deficiency anemia, histamine-fast achlorhydria, and gastric parietal cell antibody, 7 had radiocobalt (^{58}Co) vitamin B_{12} absorption characteristic of pernicious anemia, and 6 of these had reduced serum vitamin B_{12} levels (latent pernicious anemia). Normal serum vitamin B_{12} levels and Schilling tests were found in 10; and normal Schilling tests and low serum B_{12} levels in 5. Families of 6 of the latent pernicious anemia patients (76 relatives) and of 5 of the patients without latent pernicious anemia (72 relatives) were studied. There were no differences in Schilling test and B_{12} level between the 2 groups of relatives; no age or sex differences were found, nor were there differences in hemoglobin levels. Gastric parietal cell antibody was found in sera of 10 relatives of latent pernicious anemia patients and in 2 relatives of the other group. None of the relatives with gastric antibody was anemic, although 4 had previously received vitamin B_{12} treatment and 2 had received iron therapy. Addisonian pernicious anemia had been confirmed in 1. Thyroid antibody was demonstrated in 1 relative from each group. Intrinsic factor antibody was found in 3 of the 6 patients with latent pernicious anemia and in one of the 12 relatives with gastric antibody. These results suggest that gastric antibody is a manifestation of a genetically determined immunological disorder, and that autoantibodies are the result, not the cause, of tissue damage.

309 **VAGOTOMY-PYLOROPLASTY: EFFECT ON ANTRUM FUNCTION.** *(E.)* Lawson, L. J. (Vet. Admin. Hosp., Des Moines, Iowa) and L. R. Dragstedt. *Arch. Surg.* 96(1):109-113, 1968.

In 8 of 10 female dogs with Heidenhain pouches and subdiaphragmatic vagotomies, standardized Heineke-Mikulicz pyloroplasty was followed by statistically significant decrease in pouch secretion (average 42.5%). Control studies in 5 of these 10 dogs had shown vagotomy itself to be followed by large increases (97-1683%) in gastric antrum secretion. Although decreased by subsequent pyloroplasty, Heidenhain pouch secretion was not reduced to normal levels by either pyloroplasty or pylorectomy. In 9 of the 10 dogs, pyloroplasty accelerated gastric emptying. It is pointed out that the antral phase of gastric secretion, shown to be irreversibly stimulated by vagotomy, plays little or no role in the occurrence or recurrence of duodenal ulcers. In primary gastric ulcer, however, vagotomy plus pyloroplasty would probably be accompanied by a high recurrence rate.

310 **PROTECTION OF THE GASTRIC MUCOSA AGAINST THE LESIONS CAUSED BY RESERPINE THROUGH DEGRANULATION OF MUCOSAL MAST CELLS.** *(E.)* Räsänen, T. (2nd Dept. Path., U. Helsinki, Finland) and E. Taskinen. *Acta Physiol. Scand.* 71(1):96-104, 1967.

In 5-month male Sprague-Dawley rats, 1-9 i.p. injections of 0.6 or 1.0 mg reserpine at 12-hr intervals decreased the number of mitoses and caused degranulation of the mast cells in the gastric mucosa accompanied by the development of ulcerative lesions.

n the duodenum, there was no change in mitotic activity and nast cell degranulation was less pronounced. Treatment with lexamethasone (1-2 mg i.m. 5-6 times at 12-hr intervals) also narkedly decreased mitotic activity in the gastric mucosa, and caused degranulation of mast cells; after 2-3 days, however, vhen degranulation was almost complete, mitotic activity had ncreased 2-3-fold over the controls. At 10-20 days, when the nast cells had become regranulated, mitotic activity in the gas-ric mucosa was again below normal. Under similar conditions, he mitotic activity in the mucosa of the duodenum, ileum and colon showed little change, and mast cell degranulation was nuch less pronounced than in the stomach. When reserpiniza-ion was preceded by dexamethasone treatment, there was no nhibition of mitotic activity and no ulcer formation. It is uggested that ulceration due to reserpine is the result of rasodilation and postcapillary spasm caused by serotonin and nistamine liberated from the mast cells; this is prevented by prior depletion of the mast cells by agents such as dexameth-asone.

11 THE HEMATOLOGIC COMPLICATIONS FOLLOWING PARTIAL GASTRECTOMY: A STUDY OF 292 PATIENTS.

(E.) Hines, J. D. (Postgrad. Med. Sch., U. London, England), A. V. Hoffbrand and D. L. Mollin. *Amer. J. Med.* 43(4):555-569, 1967.

A follow-up study of 292 patients, 1-20 yr after partial gas-trectomy (Billroth I or Polya, uniformly about 60%) for benign ulcer (gastric in 144, duodenal in 148), revealed normal periph-eral blood smears in 106 cases; nevertheless, 3 of these 106 had iron-responsive anemia (defined as a hemoglobin below 13.6 g% for men and below 11.6 g% for women), 11 had low serum iron levels and 18 had low serum folate levels. In an-other 52 cases the blood smears showed microcytic hypochromic anemia; 48 of these patients had iron-responsive anemia, 37 had low serum iron levels, 9 had low serum folate levels and one had vitamin B_{12} deficiency. In 84 cases the blood smears showed a mixture of macrocytosis and microcytic anemia; in 45 of these patients iron-responsive anemia was associated with folate deficiency and normal serum vitamin B_{12} levels, while in the other 39 iron-responsive anemia was associated with vitamin B_{12} deficiency; 19 of the latter group also had low serum folate levels. In most of these patients, iron therapy ac-centuated the degree of megaloblastic changes in the marrow without completely correcting the anemia, while 34 patients showed a hematological response to vitamin B_{12} therapy. In the remaining 50 cases the blood smears showed a variable number of ovalomacrocytic red cells with no microcytic cells; the 14 of these in which the majority of red cells exhibited ovalomacrocytic changes were all anemic, 2 being responsive to folic acid and 12 to vitamin B_{12}. The other 36 patients included 8 nonanemic patients with low serum vitamin B_{12} levels and 28 cases of folic acid deficiency, 4 of which were anemic. Anemia was thus found in a total of 153 cases, and was attributed to iron deficiency in 97 cases, to vitamin B_{12} deficiency in 50 cases, and to folic acid deficiency in 6 cases. Laboratory studies showed that iron deficiency was present in a total of 139 cases, vitamin B_{12} deficiency in 59 cases, and folate deficiency in 75 cases. There was a marked correlation between the incidence of vitamin B_{12} deficiency and time lapse after surgery, with incidence increasing steadily for the first 8 years. There were also correlations between vitamin B_{12} deficiency and the type of surgery or site of ulcer: vitamin B_{12} deficiency developed in 30% of gastric ulcer patients and in only 8.9% of duodenal ulcer patients, regardless of the type of surgery; while among gastric ulcer patients, deficiency developed in 23% of the 104 patients undergoing Billroth I compared to 43% of the 40 patients undergoing the Polya operation. Iron and folate deficiency showed no significant relationship to type of ulcer or operation. Possible etiological factors in the malab-sorption of iron and vitamin B_{12} following partial gastrectomy are discussed, with emphasis on the role of gastric acid, pepsin and intrinsic factor.

312 MALNUTRITION AFTER PARTIAL GASTRECTOMY: INFLUENCE OF SITE OF ULCER AND TYPE OF ANASTOMOSIS AND ROLE OF GASTRITIS.

(E.) Wall, A. J. (Royal Melbourne Hosp., Victoria, Australia), B. Ungar, C. W. Baird, I. M. Langford and I. R. Mackay. *Amer. J. Dig. Dis.* 12(11):1077-1086, 1967.

Among 109 patients (83 men and 26 women aged 21-84 yr average age 60) subjected to partial gastrectomy for peptic ulcer between 1948 and 1961 and reviewed in 1963-65 (mean follow-up of 9.3 yr), 90 (83%) had developed one or more nutritional sequelae. These included atrophic gastritis (78%), hypochlorhydria (76%), anemia (26%), low serum vitamin B_{12} (45%), hypoferremia (33%), hypoalbuminemia (29%), elevated serum alkaline phosphatase (35%), and weight loss (47%). According to ulcer site (gastric or duodenal) and type of surgery (Billroth I or II), the 109 patients were divided into 4 groups and the incidence of complications in each group was compared statistically. The Billroth I procedure was limited to antroduodenectomy, with 19 of the 36 duodenal ulcer patients so treated receiving postoperative radiation. The Billroth II group, on the other hand, included 11 patients treated for recurrence following a previous Billroth I. Analysis of results shows significantly more sequelae following Billroth II gastrectomy and in patients with gastric rather than duodenal ulcer. For example, the gradient between duodenal ulcer patients treated by Billroth I and gastric ulcer patients treated by Billroth II was 55-100% for gastritis, 11-86% for anemia, 19-86% for low serum vitamin B_{12}, 9-57% for hypoferremia, and 28-86% for weight loss. Preoperative incidence of gastritis rose from 2% in duodenal ulcer and 32% in gastric ulcer patients to 95 and 100%, resp., following Billroth II gastrectomy. None of the 40 patients with post-gastrectomy atrophic gastritis showed serum antibodies to gastric parietal cells or intrinsic factor, nor did the gastritis seem to be caused by bacterial colonization of the stomach. It is suggested that the gastritis is probably related to intestinal reflux, and that there may be an intimate connection between gastritis, the late sequelae of partial gastrectomy, and the prevention of recurrent ulcer.

313 THE EFFECT OF VAGOTOMY AND DRAINAGE ON HYDROCHLORIC ACID SECRETION: A STUDY ON 55 PATIENTS USING MAXIMAL HISTAMINE STIMULATION.

(It.) Ferrarese, S. (Inst. Spec. Surg. Path., U. Bari, Italy) and V. Ronzini. *Chir. Gastroent.* 1(4):495-504, 1967.

The Kay test (maximal gastric secretion in response to histamine) was carried out in 55 patients at various times following vagotomy and pyloroplasty (39 cases) or gastroenterostomy (16 cases) for duodenal ulcer. Basal acidity decreased by an average of 82%

at 1-2 months after operation and by an average of 74, 63 and 68%, resp., after 1, 2 and 3 years; secretion in response to histamine decreased by an average of 75% 1-2 months after operation and by 72%, 60% and 66%, resp., after 1, 2 and 3 yr. Differences between cases treated by pyloroplasty and cases treated by gastroenterostomy were noted only in the 15 observed for 3 yr (average decreases of 62-63% and 73-74%, resp.). Although achlorhydria was observed in 6 patients, another 6 showed no change in gastric secretion (in 3 of these response to insulin or electrical stimulation showed denervation to be incomplete), and 6 more showed reductions of less than 50%. Long-term favorable results were thus obtained in 43 cases.

314 MECHANISMS AND TREATMENT OF DUMPING SYNDROME. *(E.)* Raffensperger, E. C. Pp. 17-22 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson (Eds.). New York, Hoeber Med. Div. Harper and Row. 319 pp.

315 CHANGES IN THE GASTRIC MUCOSA IN CHRONIC ALCOHOLICS. *(Ser.)* Soljan, N. (Gen. Hosp. Dr. M. Stojanovic, Zagreb, Yugoslavia), Lj. Pagon and J. Halle. *An. Boln. Stojanovic.* 6(1):13-16, 1967.

316 SECRETION OF BLOOD GROUP SUBSTANCES IN PATIENTS WITH CARCINOMA OF THE STOMACH. *(Pol.)* Machalski, M. (Med. Acad., Cracow, Poland), Z. Kalina and J. Wodniecki. *Pol. Arch. Med. Wewnet* 39(6): 769-773, 1967.

317 CORRELATION BETWEEN GASTRIC JUICE ANALYSIS, SUCTION BIOPSY, GASTROSCOPY, AND X-RAY DIAGNOSIS IN DISEASES OF THE STOMACH. *(Ger.)* Krentz, K. (1st Med. Clin. Free U., Berlin, Germany) and I. Buhac. *Deutsch. Med. J.* 19(1):4-12, 1968.

318 TIMELY AND LATE DIAGNOSIS OF GASTRIC CANCER. *(Cz.)* Bencur, J. M. and J. David. *Prakt. Lekar* 45(23):879-880, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

319 GASTRIC FREEZING. *(Cz.)* Sindelarova, I. *Prakt. Lekar* 45(18):696-697, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

320 A FAMILY STUDY OF PERNICIOUS ANAEMIA. 1. AUTOANTIBODIES, ACHLORHYDRIA, SERUM PEPSINOGEN AND VITAMIN B_{12}. *(E.)* Wangel, A. G. (U. Adelaide, Australia), S. T. Callender, G. H. Spray and R. Wright. *Brit. J. Haemat.* 14(2):161-180, 1968.

321 A FAMILY STUDY OF PERNICIOUS ANEMIA. 2. INTRINSIC FACTOR SECRETION. VITAMIN-B_{12} ABSORPTION AND GENETIC ASPECTS OF GASTRIC AUTOIMMUNITY. *(E.)* Wangel, A. G. (U. Adelaide, Australia), S. T. Callender, G. H. Spray and R. Wright. *Brit. J. Haemat.* 14(2):183-204, 1968.

322 INTRAARTERIAL CHEMOTHERAPY OF INOPERABLE GASTRIC CANCERS. *(Fr.)* Magendie, J. J. (Bordeaux). *Bordeaux Chir.* 4:196-203, 1967.

323 GASTRECTASIA OF UNKNOWN ETIOLOGY: A CASE REPORT. *(E.)* Castell, D. O. (U. S. Naval Hosp., Great Lakes, Ill.) and W. J. Jacoby, Jr. *Amer. J. Gastroent.* 48(40):343-348, 1967.

324 USE OF SELECTIVE GASTRIC VAGOTOMY. *(E.)* Harkins, H. N. Pp. 23-36 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson (Eds.). New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

325 GASTRIC NEUROMA. [ORAL COMMUNICATION; MED. SOC. GÖTTINGEN, GERMANY] *(Ger.)* Schlachetzki, J. *Klin. Wschr.* 45(24):1261, 1967.

326 POSTGASTRECTOMY AFFERENT LOOP VOLVULUS AND GANGRENE: A LATE COMPLICATION SIMULATING PANCREATITIS. *(E.)* Sisler, G. E. (New York U. Sch. Med., New York City), B. W. Haims and F. C. Spencer. *Amer. J. Surg.* 114(6):932-936, 1967.

327 EMBOLIZATION OF GASTRIC CONTENTS ASSOCIATED WITH RUPTURE OF THE STOMACH. *(E.)* Graham, J. W. (Office Chief Med. Examiner Coroner, Hall of Justice, Los Angeles, Calif.) and R. Breitenecker. *Arch. Path.* 84(6):659-662, 1967.

328 THE EFFECT OF INTRAVENOUS HISTALOG ON GASTRIC SECRETION IN MAN. *(E.)* Wruble, L. D. (U. Tennessee Med. Units, Memphis), A. J. Cummins, J. Goldenberg and H. Schapiro. *Amer. J. Digest. Di* 12(11):1087-1090, 1967.

329 GASTRIC RETICULOMA. *(It.)* Casaglia, L. (Maggiore Hosp., Bologna, Italy). *Riv. Gastroent* 19(2):107-122, 1967.

330 ON TWO CASES OF GASTRIC ADENOMA IN CARCINOMATOUS DEVELOPMENT. *(It.)* Galassi, G. (Pp. 205-211 in *Arch. Atti Soc. Ital. Chir.* [Proceedings of the 67th Congress, Palermo 14-16 Oct 1965] Rome, E.M.E.S., 1967. 627 pp.)

331 REFLECTIONS ON THE EARLY DIAGNOSIS OF STOMACH CANCER. *(Fr.)* Debray, C. (Bichat Hosp., Paris, France). *Sem. Hop.* 44(4):213-216, 196

332 SQUAMOUS NEOPLASMS OF THE STOMAC *(E.)* Parks, R. E. (U. Miami Sch. Med., Fla.). *Amer. J. Roentgen.* 101(2):447-449, 1967.

333 BENIGN GASTRIC TUMORS. *(Sp.)* Miyar Gonzalez, A. (Oviedo, Spain). *Rev. Esp. Enfer Apar. Dig.* 26(10):1289-1304, 1967.

334 CONTRIBUTION TO THE CYTOLOGICAL DIAGNOSIS OF NONEPITHELIAL GASTRIC NEOPLASMS. *(Sp.)* Cabre Fiol, V. (Santa Cruz & San Pabl Hosp., Barcelona, Spain), R. Olo Garcia, R. Ortiz Campos, a F. Vilardell. *Rev. Esp. Enferm. Apar. Dig.* 26(10):1193-120 1967.

STOMACH

335 **"GASTROCAMERA": EXAMINATION TECHNIQUE AND FUTURE POSSIBILITIES. PRESENTATION OF 100 EXAMINATIONS.** *(Por.)* Nakadaira, A. (Marilia Fac. Med., U. Sao Paulo, Brazil) and S. Zaterka. *Arq. Gastroenterol.* 4(4):301-308, 1967.

336 **GASTRIC PERFORATIONS BY A SOUTTAR TUBE INGESTED INTO THE STOMACH.** *(Fr.)* Levrat, M. (Edouard Herriot Hosp., Lyon, France), A. Tissort, H. Pasquier, R. Truchot and E. Phelip. *Lyon Med.* 219(1): 17-22, 1968.

337 **NEOPLASMS OF THE STOMACH.** *(E.)* McNeer, G. and G. T. Pack. J. B. Lippincott Co. Philadelphia, 1967. 555 pp.

338 **PATHOGENIC EFFECT OF THE GASTROINTESTINAL NEOSTOMY TYPE OF SUTURE IN POSTGASTRECTOMY.** *(Sp.)* Diez Cascon, A. (Army Med. Corps, Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 26(10): 1275-1284, 1967.

339 **MENETRIER'S DISEASE: SPONTANEOUS METAMORPHOSIS OF GIANT HYPERTROPHY OF THE GASTRIC MUCOSA TO ATROPHIC GASTRITIS.** *(E.)* Frank, B. W. (U. Colorado Sch. Med., Denver) and F. Kern, Jr. *Gastroenterology* 53(6):953-960, 1967.

340 **ANATOMICAL-RADIOLOGICAL ASPECTS OF GASTRIC POLYPOSIS.** *(It.)* Cainazzo, P., G. C. Palmieri, M. D'Addato. (Pp. 139-148 in *Arch. Atti Soc. Ital. Chir.* [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965]. Rome, E.M.E.S., 1967, 627 pp.)

341 **POLYPOSIS AND BENIGN POLYPOID TUMORS OF THE STOMACH.** *(It.)* Cocchieri, G., A. Vestri, and F. Dardi. (Pp. 178-185 in *Arch. Atti Soc. Ital. Chir.* [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965]. Rome, E.M.E.S., 1967, 627 pp.)

342 **THE DEGENERATIVE CAPACITY OF GASTRIC POLYPOSIS.** *(It.)* D'Addato, M. and E. Cainazzo. (Pp. 186-194 in *Arch. Atti Soc. Ital. Chir.* [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965]. Rome, E.M.E.S., 1967, 627 pp.)

343 **POLYPOSIS OF THE GASTRO-ENTERIC CANAL. CLINICAL AND STATISTICAL REMARKS.** *(It.)* Dedola, G., W. Rabitti and P. Ferrari. (Pp. 195-201 in *Arch. Atti Soc. Ital. Chir.* [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965]. Rome, E.M.E.S., 1967, 627 pp.)

344 **CLINICAL STUDIES OF EARLY GASTRIC CANCER: REPORT 1. CLINICAL AND STATISTICAL SURVEY OF EARLY GASTRIC CANCER OBSERVED IN OUR DEPARTMENT.** *(Jap.)* Wakisaka, G. (Fac. Med. Kyoto U., Japan), T. Inoue, A. Miyoshi, M. Ohbayashi, M. Moriga, H. Sugimoto, N. Iwai, A. Moriya, K. Ochi, K. Kogawa, K. Tomie, S. Hirano, M. Kobayashi, T. Suyama, M. Watanabe, T. Mayake, Y. Yagiro, K. Hajaro, Y. Yamamoto, J. Ariyoshi, T. Suzaki, Y. Kanematsu, S. Ohkawa, T. Taguchi, T. Kitagawa, M. Fukuda, T. Imajima, K. Ito, K. Hikima, S. Hashimoto, M. Ohishi, S. Mitsutani, T. Imoto, A. Shirakawa, S. Nakai and K. Inque. *Jap. Arch. Intern. Med.* 14(9):255-273, 1967.

See also abstract nos.: 103,104,105,132,133,388

SMALL INTESTINE

345 INTESTINAL PROTEIN LOSS IN RATS WITH BLIND SEGMENTS ON THE SMALL BOWEL. *(E.)* Nygaard, K. (U. Oslo, Norway) and K. Rootwelt. *Gastroenterology* 54(1):52-55, 1968.

Self-filling blind segments were created in the jejunum or distal ileum of 20 adult male rats weighing 280-420 g to determine whether increased fecal nitrogen was due to intestinal malabsorption or serum protein loss; 13 unoperated rats served as controls. Serum proteins were labeled intravenously with radioactive chromium (Cr^{51}) chloride. The study was repeated in 24 normal and operated rats following chloramphenicol administration. Fecal Cr^{51} excretion was higher in rats with jejunal blind segments than in normal rats; chloramphenicol decreased excretion to normal levels. Rats with distal ileum blind segments showed nearly normal Cr^{51} excretion which was decreased significantly below normal by chloramphenicol. The results indicate that increased fecal nitrogen excretion and hypoproteinemia in blind loop syndrome are partly due to increased protein loss from the small intestine; whether this loss is caused by malabsorption was not shown.

346 BENIGN AND MALIGNANT TUMORS OF THE SMALL INTESTINE. *(E.)* Croom, R. D., III (U. North Carolina Sch. Med., Chapel Hill) and J. F. Newsome. *Southern Med. J.* 61(3):270-274, 1968.

A review is presented of 46 patients with benign (25) or primary malignant (21) tumors of the small intestine who underwent operation during the period 1952-1966. The 21 patients with malignant lesions (10 men, 11 women; age range 34-69 yr) had symptoms for an average of 9 months before diagnosis. Chief symptoms were abdominal pain, malaise, anorexia, weight loss, bleeding and nausea and vomiting; an abdominal mass was noted in only 5 instances. Four of the malignancies occurred in the duodenum, 7 in the jejunum and 11 in the ileum. Among the 25 with benign lesions (14 men, 11 women; age range 27-81 yr) only 12 were symptomatic with bleeding, abdominal pain, and nausea and vomiting as the most common complaints. If the prognosis for patients with small intestinal malignancies is to be improved, earlier diagnosis is necessary. A high index of suspicion is mandatory with any vague, nonspecific, gastrointestinal complaints in patients over 40 years of age. Careful evaluation by upper gastrointestinal and small and large intestinal barium examinations should be obtained without delay. Early exploratory celiotomy should be performed in symptomatic patients even though no abnormality may be detected on radiologic examination.

347 SMALL-BOWEL ABNORMALITIES IN DERMATITIS HERPETIFORMIS. *(E.)* Marks, R. (St. John's Hosp. Dis. Skin, London, W.C. 2, England), M. W. Whittle, R. J. Beard, W. B. Robertson and S. C. Gold. *Brit. Med. J.* 1(5591):552-555, 1968.

Twenty-nine patients with dermatitis herpetiformis were investigated by jejunal biopsy and tests of intestinal function. Jejunal mucosal abnormalities were found in 20 (70%) of the patients. Two suffered from a malabsorption syndrome; one was treated with a gluten-free diet and his skin and gut disorder subsequently remitted. Many of the patients had low serum vitamin B_{12} and folate and 6 had megaloblastic changes in the marrow.

348 THE FLORA OF THE SMALL INTESTINE UNDER PHYSIOLOGICAL AND PATHOLOGICAL CONDITIONS. *(It.)* Ferri, S. (Inst. Gen. Clin. Med. & Med. Ther. U. Bologna, Italy), P. Azzaroli, R. DiFeliciantonio and E. Figus. *Riv. Gastroent.* 19(2):61-77, 1967.

Based on a detailed review of the literature and a compilation of available data, it is concluded that in the normal subject, the jejunum is sterile in about 50% of the cases while the ileum is sterile in at least 20%. In nonsterile cases the flora tends to be sparse and of the oral type (streptococci and staphylococci); a fecal flora, which is always subordinate to the oral flora, can be isolated from the jejunum and ileum in only about 10% and 42% of the cases, resp. In patients with gastrointestinal diseases (such as pernicious anemia, cirrhosis of the liver, diverticulitis, ulcers, cancer of the stomach) or previous gastric surgery, on the other hand, positive bacteriological findings are obtained from the jejunum in 81% and from the ileum in 98% of the cases, although the jejunum still tends to be sterile in cases of chronic diarrhea or sprue. In all cases, the flora is more abundant than under normal conditions, and is usually of a mixed oral and fecal type. Coliform organisms can be isolated from the jejunum in about 46% of the cases and from the ileum in about 66%.

349 ANTIPERISTALTIC SEGMENT FOR PROFUSE ILEOSTOMY DIARRHOEA. *(E.)* Ellis, H. (Dept. Surg., Westminster Hosp., London S. W. 1, England) and I. Coll. *Brit. Med. J.* 1(5591):556-557, 1968.

A case is presented of a young woman who underwent resection of the left colon and rectum with transverse colostomy for treatment of polyposis coli. Three years later the right side of the colon was resected and an ileostomy was performed. During the next 7 years of her life the patient was plagued by incessant diarrhea through the stoma so that she required repeated hospital admissions for treatment of excoriation of the skin of the whole abdominal wall and for episodes of dehydration. These conditions were not helped by drugs, dietary manipulations or refashioning of the ileostomy. At age 23, a 3-inch segment of ileum 12 inches above the ileostomy was mobilized on its vascular pedicle, divided at each end, and reversed and then anastomosis was completed. In 6 months her condition was markedly improved. She led a normal life, was back at work, and was considering matrimony.

350 PNEUMATOSIS INTESTINALIS. *(E.)* Dammert, K. (U. Oulu, Finland), F. Stenbäck and O. Räsänen. *Acta Path. Microbiol. Scand.* 71(1):25-34, 1967.

Necropsy of a 70-yr-old male with no history of gastrointestinal disturbance and who died of subarachnoidal bleeding, revealed pneumatosis intestinalis of the small bowel. The upper gut revealed 3 diverticula and numerous gas cysts of the submucosa and muscularis propria; some cysts were compartmentalized. Lymph vessels and muscle bundles were the sites of the first changes related to cyst formation. The cyst walls were lined with this endothelium under a dense collagen layer surrounded by many elastic fibers. Gas originating in the diverticula, forced through the mucosa, and transported distally in the submucosa is thought to give rise to these cysts.

SMALL INTESTINE

351 **TECHNICAL NOTE ON DUODENOTOMY DURING TRANSDUODENAL SPHINCTEROTOMY.** *(It.)* Broglia, S. (San Giovanni Hosp., Rome, Italy) and B. Sbuelz. *Chir. Gastroent.* 1(4):534-536, 1967.

Some recent improvements in the technique for duodenotomy are described on the basis of experience with some 160 cases of transduodenal sphincterotomy, none of whom developed either stenosis or fistulas. The incision should be carried out in the lower part of the descending duodenal segment, controlled by means of a transcholedochal catheter, and preceded by accurate mobilization of the duodenum from right to left (technique of Kocher); it is sometimes necessary to free the root of the duodenum from the transverse mesocolon. Since the usual longitudinal incision closed by transverse suture can produce tension, it is preferable to make a small transverse or oblique incision 1-2 cm long with an electric scalpel, followed by retraction of the duodenal wall. Sphincterotomy can then be carried out at the upper pole of the region of Suarez (at 11-12 o'clock). The incision is closed in two stages, the first involving the mucosa and part of the muscles and the second closing the serosa. It is concluded that the dangers of duodenotomy have been overrated.

352 **DUODENAL OBSTRUCTION DUE TO AN ANOMALOUS PORTAL VEIN.** *(E.)* Kakkar, V. V. (King's Coll. Hosp. Med. Sch. London, England) and A. M. B. Tompkin. *Postgrad. Med. J.* 44(508):189-190, 1968.

A 29-yr-old male was admitted with the complaint that he had to take two meals in quick succession to feel satisfied. He also complained of occasional attacks of epigastric pain following immediately after the second meal which were relieved by vomiting. At operation the obstructing agent was seen to be an anomalous portal vein passing in front of the first and second parts of the duodenum and compressing it. A retrocolic gastrojejunostomy was performed which led to complete freedom of symptoms.

353 **RADIOCINEMATOGRAPHIC STUDIES ON DYSKINESIA OF THE SMALL INTESTINE.** *(Fr.)* Lenz, H. (Med. Polyclin., U. Bonn, Germany). *Acta Gastroent. Belg.* 30(10):659-668, 1967.

The anatomical and electrophysiological bases of radiocinematographic research into intestinal dyskinesia are reviewed and examples are given of films made in: 1) a patient with hyperthyroidism and autonomic hyperexcitability resulting in hypertonia and accelerated peristalsis of the small intestine; 2) patients with diarrhea caused by allergy to fish and milk or to pollen; 3) dyskinesia due to segmental spasms; 4) a cat following i.m. injection of pilocarpine or arecoline. The intimate relationship between intestinal tone and motility is emphasized. 18 refs.

354 **PANEL DISCUSSION ON DISEASES OF THE SMALL INTESTINE.** *(E.)* Kowlessar, O. D. (Jefferson Med. Coll., Philadelphia, Pa.), F. Goldstein and C. W. Wirts. *Amer. J. Gastroent.* 48(6):469-485, 1967.

Discussed were the etiology, pathology, laboratory studies, physiology, and treatment of childhood and adult celiac disease as well as regional enteritis. Although its etiology is not known, it has been established that gluten plays a significant role in the pathogenesis of celiac disease and that the harmful factor resides in gliadin, the alcohol soluble fraction of gluten. Two mechanisms have been proposed for the mechanism of gluten toxicity, that of an inborn enzyme error of metabolism or a local immunologic hypersensitivity to gluten or gluten peptide. The role of the small intestinal bacterial flora in the pathogenesis of malabsorption was also presented. Patients with various blind loop syndromes frequently manifest varying degrees of malabsorption. A case is reported of a patient with a single, large duodenal diverticulum who suffered severe weight loss, diarrhea and steatorrhea. In this patient, the bacterial flora decreased from 10^{10} col./ml to zero while undergoing antibiotic treatment. Malabsorption manifested by diarrhea, steatorrhea and weight loss may develop in patients with regional enteritis before or after surgery.

355 **LEIOMYOSARCOMA OF THE DUODENUM.** *(Sp.)* Gomez-Ferrer, F. (Valencia, Spain) and J. Fornes. *Rev. Esp. Enferm. Apar. Dig.* 26(8):1035-1041, 1967.

356 **GASTRIC COOLING FOR UPPER INTESTINAL BLEEDING.** *(E.)* Wangensteen, S. L. Pp. 288-296 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson (Eds.). New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

357 **DISCUSSION OF THE SMALL BOWEL.** *(E.)* Bockus, H. L. (Chairman) Pp. 233-241 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson (Eds.). New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

358 **MASSIVE SMALL BOWEL RESECTION OR BYPASS.** *(E.)* Stahlgren, L. H. Pp. 208-215 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson (Eds.). New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

359 **SMALL INTESTINAL LESIONS DUE TO VASCULITIS.** *(E.)* Finkbiner, R. L. Pp. 170-175 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson (Eds.). New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

360 **SURGERY OF THE SMALL INTESTINE IN THE ADULT (VOL. 7 OF MAJOR PROBLEMS IN CLINICAL SURGERY).** *(E.)* Colcock, B. P. and J. W. Braasch. Philadelphia, London, Toronto, W. B. Saunders Co., 1968. 220 pp.

361 **MULTIPLE HAEMANGIOMAS OF THE SMALL INTESTINE AS A CAUSE OF INTESTINAL BLEEDING IN A 7-YEAR-OLD GIRL.** *(Pol.)* Derulska, D. (1st Acad. Med. Ped. Clin., Warsaw, Poland) and A. Romanowska. *Pol. Tyg. Lek.* 23(7):232-233, 1968.

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362 OBTURATOR HERNIA AS A CAUSE OF ACUTE INTESTINAL OBSTRUCTION. *(E.)* Joseph, W. L. (UCLA Sch. Med., Los Angeles, Calif.), C. S. Kipen and W. P. Longmire Jr. *Amer. J. Surg.* 115(3):301-306, 1968.

363 GASTRODUODENOSTOMY: AN ANSWER TO THE DIFFICULT DUODENAL STUMP. *(E.)* Fuerst, E. J. (Golden Clinic, Elkins, W. Va.). *Amer. J. Surg.* 115(3):287-290, 1968.

364 SEVENTEEN PATIENTS WITH PEUTZ-JEHGERS SYNDROME IN FOUR GENERATIONS. *(E.)* McAllister, A. J. (U. Utah Coll. Med., Salt Lake City), N. F. Hicken, R. G. Latimer and V. R. Condon. *Amer. J. Surg.* 114(6):839-843, 1967.

365 COMBINED INCARCERATION OF BLADDER AND ILEUM IN INGUINAL HERNIAS. *(E.)* Morel, A. S. (Beckman-Downtown Hosp., New York City) and P. Exelby. *Amer. J. Surg.* 114(6):882-887, 1967.

366 ENTEROLITHIASIS ASSOCIATED WITH SIDE-TO-SIDE INTESTINAL ANASTOMOSIS. *(E.)* Kia, D. (Vet. Admin. Hosp., Des Moines, Iowa) and L. R. Dragstedt, Jr. *Arch. Surg.* 95(6):898-901, 1967.

367 GASTROINTESTINAL BLEEDING FROM JEJUNAL DIVERTICULA. *(E.)* Civetta, J. M. (Harvard U. Med. Sch., Boston, Mass.). *Ann. Surg.* 166(6): 976-979, 1967.

368 SURGICAL TREATMENT OF A DUODENAL DIVERTICULUM WITH INTRADIVERTICULAR EMPTYING OF THE COMMON BILE DUCT AND DUCT OF WIRSUNG. *(It.)* Fivoli, E. (San Giovanni Hosp., Rome, Italy) and P. Malatesta. *Chir. Gastroent.* 1(3):418-422, 1967.

369 POPULATION CONTROL IN THE SMALL BOWEL. *(E.)* Gorbach, S. L. *Gut* 8(6):530-532, 1967.

370 CARCINOID TUMORS ARISING IN MECKEL'S DIVERTICULUM: REPORT OF A CASE. *(E.)* Figueroa, G. (Framingham Union Hosp., Framingham, Mass.) and L. G. Tedeschi. *Amer. J. Digest. Dis.* 12(11):1178-1180, 1967.

371 CONSERVATIVE TREATMENT OF PERFORATION AND BILE PERITONITIS AFTER PERORAL JEJUNAL BIOPSY: REPORT OF A CASE. *(E.)* Akarawong, K. (Vet. Admin. Res. Hosp., Chicago, Ill.) and J. B. Hammond. *Amer. J. Digest. Dis.* 12(11):1181-1184, 1967.

372 POTASSIUM-INDUCED STENOSIS OF THE SMALL INTESTINE, WITHOUT ULCERATION. *(Fr.)* Van der Hoeden, R. (Ixelles Inst. Med. Surg., Brussels, Belgium), R. Heimann, A. Delcourt and A. Niederkorn. *Acta Gastroent. Belg.* 30(5/6):441-451, 1967.

373 RECURRENT SMALL BOWEL MYOSARCOMA. *(E.)* Editorial. *J. Mt. Sinai Hosp.* 35(1):102-103, 1968.

374 RADIOLOGY OF THE DUODENUM. *(E.)* Kemp Harper, R. A. Assoc. Amer. Book Publ., Chicago, 1967. 225 pp.

375 INTESTINAL PNEUMATOSIS: PRESENTATION OF FIVE CASES. *(E.)* Andrade S., V. H. (Eugenio Espejo Hosp., Quito, Ecuador). *Amer. J. Proctol.* 19(1):36-46, 1968.

See also abstract nos.: 180,193,294,301

Peptic Ulcer

376 THE CLINICAL FINDINGS IN PERFORATION OF GASTRODUODENAL ULCERS. *(It.)* Izar, G. (Fac. Med., U. Siena, Italy). *Riv. Gastroent.* 19(2):78-82, 1967.

In a brief review, the author distinguishes between acute, subacute and chronic perforation (on the basis of the succeeding peritonitis) and describes the clinical course of each type. Acute perforation can be divided into the shock phase, the phase of remission, and the phase of frank peritonitis. On the basis of the clinical characteristics, perforated ulcer can be distinguished from acute pancreatitis, acute appendicitis, intestinal obstruction, extrauterine pregnancy, mesenteric thrombosis, and biliary or renal colic. The differential diagnosis is confirmed, and the exact type of perforation involved is identified, from the features of the subsequent peritonitis.

377 THE OPERATION OF CHOICE FOR PEPTIC ULCER DISEASE. *(E.)* Rosemond, G. P. (Temple Univ., Philadelphia, Pa.) and F. A. Reichle. *Amer. J. Gastroent.* 48(5):392-409, 1967.

The operation of choice in peptic ulcer disease depends on many factors and must be individually determined. Subtotal gastrectomy is used to remove large proportions of acid-secreting cells, but only a small gastric reservoir remains and the cephalic phase of gastric secretion is not controlled. Marginal ulcers have been reported following subtotal gastrectomy. In a reported study 90% survived 10 yr after surgery, following their usual occupations; 82% needed no dietary restrictions. Subtotal gastrectomy is not considered a good procedure for normal or subnormal wt patients. Hemigastrectomy and vagotomy is effective for long-term control of duodenal ulcers. In a 10-year follow-up, 68% were free of all symptoms and tolerated unrestricted diets and 26% experienced occasional epigastric fullness after meals, mild dumping, and diarrhea. The advantages of this procedure are maintenance of good general nutrition, lasting benefits, low mortality, ablation of cephalic and gastric secretion and increased protection against recurrent ulceration. These are procedures of choice for underweight patients. Disadvantages of hemigastrectomy are that it involves division of the duodenum, and lacks postoperative long-term follow-up. Vagotomy with draining is less commonly used. Vagotomy reduces muscular activity and causes prolonged gastric retention, necessitating an effective emptying procedure to overcome gastric stasis. Vagotomy with draining is designed to heal duodenal ulcers with minimal mortality and morbidity, maximal maintenance of gastric reservoir, and minimal disturbance of normal digestion. It should be considered for patients in poor general condition causing medical risk, those in poor nutritional status, those with large duodenal granuloma secondary to chronic ulcer disease, and those with minimal ulcer disease and underweight. Preoperative factors affecting choice of procedure are the patient's weight, general medical condition, dietary likes and dislikes, bowel habits, gastric acidity, age, and sex. Factors affecting choice during the operation are the extent and location of the ulcer and the amount of duodenal bulb distortion.

378 AMINOSUGARS IN CASES OF GASTRIC ULCERS. I. THE AMOUNT OF GLUCOSAMINE AND GALACTOSAMINE IN THE HUMAN GASTRIC MUCOSA. *(E.)* Zwierz, J. (Med. Sch., Bialystok, Poland), J. Badurski, A. Gindzienski and M. Kaczmarski. *Gastroenterologia* 108(4): 197-204, 1967.

The glucosamine and galactosamine content of 1-g gastric mucosa specimens from 6 gastrectomy patients were determined. The stomachs were dissected to separate the mucosa from the tunica muscularis. Specimens were hydrolyzed and the hydrolyzates purified and analyzed for aminosugars according to Good and Bessman's method. The presence of these two aminosugars in human gastric mucosa was confirmed, the mean values of glucosamine and galactosamine being 10.63 µM and 5.08 µM per 1 g wet tissue resp. .

379 OUR CONCEPT IN VAGOTOMY. *(E.)* Alexiu, O. (Bates Hosp., Bucharest, Rumania). *Chir. Gastroent.* 1(4):493-494, 1967.

On the basis of experience with 200 cases of gastroduodenal ulcer, it is concluded that selective gastric vagotomy followed by efficient gastric drainage (such as by pyloroplasty) is the treatment of choice for peptic ulcer. It is emphasized, however, that the vagotomy must be complete with respect to the stomach in order to prevent recurrences. Among the 200 personal cases, there were no fatalities and only one recurrence in a follow-up of 1-6 years.

380 CLINICAL STUDIES ON THE TREATMENT OF PEPTIC ULCER. I. AMBULATORY TREATMENT OF GASTRIC ULCERS WITH ULTRANOL. *(Ger.)* Berndt, H. (Inst. Cancer Res., German Acad. Sci. Berlin, Berlin-Buch, Germany), H. J. Gutz, K. H. Jacobasch, K. Marquardt, B. Prahl and G. Wolff. *Deutsch Gesundh* 23(1): 12-15, 1968.

Studies in 57 ulcer patients (average age 58.8 yr, including 35 with a previous history of ulcer and 13 with previous gastritis) revealed no significant difference between the symptomatic and objective effects of glycyrrhizinic acid (Ultranol; 28 patients) and a polyvitamin preparation (Summavit) given as a placebo (29 patients). Both preparations were given at a dosage of 2 tablets 3 times daily for 3 weeks, plus hot abdominal compresses twice daily and the proscription of tobacco, alcohol, coffee and highly seasoned foods. Both preparations had a variable analgesic effect, while decrease in size or disappearance of the ulcer was observed radiologically in 20 patients and 22 controls and gastroscopically in 13 patients and 8 controls. There were no side effects. In view of the repeatedly confirmed therapeutic activity of the British preparation Biogastrone (carbenoxolone, a glycyrrhizinic acid derivative), its use in the treatment of gastric ulcers is recommended rather than Ultranol.

381 COMPARISON OF SYMPTOMS AFTER VAGOTOMY WITH GASTROJEJUNOSTOMY AND PARTIAL GASTRECTOMY. *(E.)* Cox, A. G. (Royal Postgrad. Med. Sch., London, England). *Brit. Med. J.* 1(5587):288-290, 1968.

The incidence and severity of symptoms are compared in 51 male patients after vagotomy with gastrojejunostomy and in 55 male patients after partial gastrectomy (Polya) for treatment of duodenal ulcers. The patients in both groups were of similar age, weight and height, and were interviewed approximately

7-10 yr after surgery. Although the differences in postoperative symptoms are small, they favor vagotomy with gastrojejunostomy. Fullness after meals was the most common symptom after gastrectomy and disturbed bowel function was the most common symptom after vagotomy.

382 **PEPTIC ULCERS IN CHILDREN.** *(E.)* Coddington, R. D. (Ohio State U. Coll. Med., Columbus). *Psychosomatics* 9(1):38-43, 1968.

Studies on the incidence of peptic ulcers in children reveal that subjects can be classified as hypersecretors and hyposecretors; peptic ulcers are more likely to occur in the hypersecreting group. One study has shown that hypersecreting children aged 4-6 yr and 10-14 yr have a high incidence of duodenal ulcers. Certain personality factors (i.e., the need for oral approval) and environmental factors (i.e., changes threatening one's dependent relationship) can cause ulcers in the hypersecreting group. Ulcer incidence was lowest in pregnant women and lower in prepubertal and pubertal females than in males in the same age group. Female hormone extracted from the urine of pregnant women have a prophylactic and healing effect on ulcers in dogs. The difficulty in diagnosing peptic ulcers in school age children may account for the decreased incidence of peptic ulcers in this age group; 56% of children with peptic ulcers have a positive family history for the condition. The diagnosis of peptic ulcers in children depends upon demonstration of hypersecretion of acid in the gastric mucosa, the observation of a nuclear conflict regarding activity and passivity, the uncovering of an environmental event that intensifies conflict, and the demonstration of an ulcer.

383 **ACID AND ALKALINE SECRETION IN PATIENTS WITH GASTRIC ULCER OF THE LESSER CURVATURE.** *(E.)* Goldenberg, N. (C. J. Parhon Hosp., Iasi, Romania), A. Danaita, B. Ostap and V. Ababei. *Gastroenterologia* 108(5):233-238, 1967.

Studies relating gastric ulcer site with age, onset of ulcer, duration of illness, and acid and alkaline gastric secretion were done in 120 patients with ulcers of the lesser curvature of the stomach. Each patient received 3-4 tube feedings of alcohol, insulin, or histamine to stimulate gastric secretion. Gastric secretory samples were taken every 15 min and evaluations of volume, maximum acid output per hr (M.A.O.), and electrolytes were made. Ulcers of the vertical portion of the lesser curvature occurred in 73% of the patients; 7% had ulcers of the horizontal portion or incisura angularis; and 20% had ulcers of the prepyloric region. Acid secretion and gastric secretory volume decreased and alkaline secretion increased after stimulation in patients with vertically located ulcers. Gastric secretory volume was normal in patients with incisura angularis ulcers. M.A.O. increased from 2.61 mEq/liter in patients with vertically located ulcers to 5.57 mEq/liter in those with prepyloric ulcers. There were no significant changes related to age, sex, or duration of illness.

384 **MORPHOLOGICAL OBSERVATIONS ON GASTRIC ULCERS TREATED WITH CARBENOXOLONE SODIUM.** *(E.)* Goodier, T. E. W. (St. Helier Hosp., Carshalton, Surrey, England), L. Horwich and R. W. Galloway. *Gut* 8(6):544-547, 1967.

Four chronic ulcer patients, aged 31-69 yr, were treated with 50 or 100 mg (thrice daily) of sodium carbenoxolone (Biogastrone) 4 days to 6 weeks prior to partial gastrectomy. Carbenoxolone facilitated the normal healing process in gastric ulcers, as far as could be seen by routine histochemical methods, by increasing mucus secretion by the gastric epithelium and particularly by regenerating epithelial cells in the vicinity of the healing ulcer. It is suggested that increased mucin production by the gastric epithelium is a physiological response playing a part in mucosal protection and repair.

385 **HYPERCALCEMIC CRISIS AND INTRACTABLE GASTROINTESTINAL ULCERATION IN A PATIENT WITH ENDOCRINE POLYGLANDULAR SYNDROME.** *(E.)* Condon, R. E. (Dept. Surg., U. Chicago, Ill.), G. E. Granville, P. H. Jordan, Jr. and A. H. Helgason. *Ann. Surg.* 167(2):185-190, 1968.

The case history of a 51–yr-old man with endocrine polyglandular syndrome and gastrointestinal ulceration is presented. A pituitary tumor was inferred when radiographic skull studies showed an enlarged sella turcica; the tumor was assumed to be a chromophobe adenoma, since no clinical evidence of acromegaly or Cushing's syndrome was found. Hypercalcemic crisis led to subtotal parathyroidectomy; histological examination of resected tissue revealed massive parathyroid chief cell hyperplasia. The patient, having previously undergone subtotal gastrectomy for a duodenal ulcer, splenectomy, and partial pancreatectomy for multiple non-beta cell tumors, developed 2 large perforated marginal ulcers which were treated by resection of the residual stomach and esophagojejunostomy; massive infection, adhesions and scarring prevented pancreatic exploration during surgery. Parathyroidectomy and total gastrectomy resulted in relief of symptoms. Preoperative Na^+ conservation and hypokalemia were attributed to poor dietary intake and disordered gastrointestinal function. The pancreatic islet tumors of non-beta cell origin caused intractable duodenal ulceration.

386 **THE QUESTIONABLE INDICATIONS FOR VAGOTOMY.** *(It.)* Ferrarese, S. (Inst. Spec. Surg. Path. U. Bari, Italy), V. Ronzini and V. Disanto. *Riv. Gastroent.* 19(1):37-46, 1967.

Based on a review of the literature on the effectiveness of vagotomy in a variety of conditions, sharp disagreement is expressed with those surgeons who perform a vagotomy indiscriminately without consideration of the many inherent problems in the method. Cited were duodenal ulcer with hormonal or mixed hyperacidity, ulcerative colitis and diarrhea, the ulcer syndrome in the absence of an ulcer, bleeding or perforated duodenal ulcers, coexistent ulcer and cirrhosis, duodenal ulcer following freezing, gastric ulcers, the combination of gastric and duodenal ulcers, and postoperative peptic ulcer. It is urged that the candidates for vagotomy be carefully selected on the basis of the modern concepts as to the physiopathology of ulcer disease.

387 **JUVENILE GASTRODUODENAL ULCERS.** *(It.)* Briguglio, A. (Main Hosp., Bologna, Italy) and L. Casaglia. *Riv. Gastroent.* 19(1):13-24, 1967.

Among 21 young patients (17 boys and 4 girls, 13-20 yr old at operation, 7-18 yr old at the first appearance of symptoms) subjected to gastroduodenal resection for duodenal (20 cases) or gastric (1 case) ulcers, 8 had a positive family history of ulcers and 6 had had an appendectomy. Complications such as stenosis, melena or perforation were present in 16 cases; none had responded to previous medical treatment. Among 19 who were followed 1.5-7 yr after operation, 16 showed good results; there was one case with melena, one with epigastralgia and one with dyspepsia. Surgical intervention had no apparent effect on the blood picture or on the mental or physical development of the patients. Resection is highly recommended as the treatment of choice in juvenile ulcers. The etiology and symptoms of ulcers in adolescence are briefly discussed.

388 AN EVALUATION OF GASTRIC RESECTIONS FOR DUODENAL ULCER.

(E.) DeKraay, W. H. (Ottumwa, Iowa), G. C. Blome, K. E. Lister and H. L. Wormhoudt. *J. Iowa Med. Soc.* 58(3):268-273, 1968.

An evaluation is presented of 216 operations performed in the period from 1951 to 1963 for duodenal, combined gastric and duodenal, or stomal ulcers. Among the 165 males and 51 females, ages ranged from 18-81 yr. There were 76 Billroth I procedures, and 140 Billroth II operations performed retrocolically. There were 7 deaths in the 30 days after operation. Satisfactory follow-up for a minimum of 3 yr or until death was accomplished in 206 patients. Longest follow-up was 15 yr. Eleven patients developed stomal ulcers that required another operation. In this group of 11, recurrence took place in 3 yr in all but 1 case which occurred after 5 yr. For treatment, 8 patients had vagotomies; 3 of these had a poor result. Two underwent resection; in one case vagotomy was also employed. One patient was treated by a gastroenterostomy for a perforation after a Billroth I anastomosis. Recurrence rate in this series was 5.1% which compares with 7.9% reported in 15 other series.

389 HYDROCHLORIC ACID SECRETION CAPACITY OF THE STOMACH AS AN INHERITED FACTOR IN THE PATHOGENESIS OF DUODENAL ULCER.

(E.) Fodor, E. (Third Med. Clinic, Cluj, Romania), S. Vestea, S. Urcan, S. Popescu, L. Sulica, R. Iencica, A. Goia and V. Ilea. *Amer. J. Dig. Dis.* 13(3):260-265, 1968.

The hydrochloric acid response to maximal histamine stimulation was investigated in 428 subjects which included 160 with duodenal ulcer (DU), 113 nonulcerated members of DU families, and 155 healthy controls without a family history of ulcer. The data obtained were correlated with ABO blood group status and secretor status as determined in the saliva. Both DU patients and healthy members of ulcer families showed a highly significant increase of acid output compared with the controls. Among healthy controls, acid output of Group O subjects was not significantly different from that of all other blood groups combined; nor was there any significant difference between nonsecretory and secretory controls or between Group O nonsecretory and secretory persons of other groups. While acid secretion of O nonsecretors of members of DU families was lower than that of DU group O nonsecretors, this difference was not significant. This association of blood Group O and nonsecretion genes with an increased capacity for acid secretion in duodenal ulcer subjects and their healthy relatives might suggest a pleiotropic effect of these genes.

390 A COMPARISON OF OXYPHENCYCLIMINE HYDROCHLORIDE AND PROPANTHELINE BROMIDE IN PATIENTS WITH DUODENAL ULCER.

(E.) Alea, J. A. (Vet. Admin. Hosp., Buffalo, N. Y.) and J. T. Aquilina. *Amer. J. Dig. Dis.* 12(11):1122-1130, 1967.

Forty male patients aged 30-50 with uncomplicated duodenal ulcers were randomly assigned to two groups (20 each) and were subjected to gastric analyses after administration of 5 mg oxyphencyclimine hydrochloride (Daricon) or 15 mg propantheline bromide. Both drugs reduced H ion concentration both before and after stimulation with insulin. Before insulin stimulation, oxyphencyclimine reduced H ion concentration to a greater extent than did propantheline. There was no statistical difference in acid output due to the two drugs after insulin stimulation. After completion of the secretory tests, the same drug (at the same dose) was continued for 2 weeks, being administered 1 hr before each meal. Observation of side effects 1, 2 and 3 hr after administration of each dose, revealed fewer undesirable effects with oxyphencyclimine.

391 THE EFFECT OF GLYCOPYRROLATE ON THE COURSE OF SYMPTOMATIC DUODENAL ULCER.

(E.) Trevino, H. (Fac. Med., U. Nuevo Leon, Monterrey, Mexico), J. Anderson, P. G. Davey and K. S. Henley. *Amer. J. Dig. Dis.* 12(10):983-987, 1967.

A double-blind study of glycopyrrolate (Robinul; administered orally at the maximum tolerated dose which was usually 2 mg three times daily) in 46 men (average age 52.1 yr) with duodenal ulcer (average duration 15.2 yr) revealed no beneficial effect over a period of 18-27 months. All patients were started on increasing doses of glycopyrrolate during a 5-day period of hospitalization, after which they were either continued at the maximum tolerated dose or switched to placebo (calcium phosphate, carbowax, starch, lactose and magnesium stearate). Follow-up studies showed that 14 of 26 on the drug and 11 of 20 on placebo improved, while 8 in each group became worse. It is suggested that glycopyrrolate may be more effective in younger men with a shorter history of disease.

392 SOME PITFALLS IN ANTISECRETORY DRUG TRIALS: SUBJECT SELECTION, COLLECTION PERIOD, AND DAYTIME VARIATION.

(E.) Moore, J. G. (U. Utah Coll. Med., Salt Lake City) and E. Englert, Jr. *Amer. J. Dig. Dis.* 12(10):973-982, 1967.

A double-blind, randomized, crossover study of glycopyrrolate (either 2 mg Robinul administered twice at 6-hr intervals or 4 mg in sustained-release form given once a day) in 10 males (31-68 yr old) with demonstrated gastroduodenal ulcers and hypersecretion in response to betazole HCl showed that the two forms of the drug are essentially equivalent in their suppressant effect on basal gastric secretion. Thus, the mean 12-hr secretion of free acid was reduced from a basal value of 57 mEq (13-110 mEq) to 8 mEq (0.1-37 mEq) by the standard preparation and to 9 mEq (0.1-53 mEq) by the sustained-release preparation. In the study as a whole, individual variations in response were marked, however, as were variations in acid secretion from hour to hour. Analysis showed that some of the subjects were normosecretors, in whom the basal secretion and drug-inhibited secretion values were close. It is emphasized that anticholinergic drugs should be tested only in subjects with demonstrated basal hypersecretion. Furthermore, such trials should be continued over prolonged periods and should include identical control periods in a crossover design to avoid errors caused by variations in secretion and unreliability of the results during the initial hours.

393 **HYPERPARATHYROIDISM AND PEPTIC ULCER DISEASE.** *(E.)* Ellis, C. (Vet. Admin. Hosp., Minneapolis, Minn.) and D. M. Nicoloff. *Arch. Surg.* 96(1):114-118, 1968.

Among 23 cases of primary hyperparathyroidism seen between 1948 and 1965, 7 (27-75 yr old) were found to have a radiologically demonstrable peptic ulcer (6 duodenal and 1 gastric). This represents an incidence of 30.5% compared to an estimated 7-10% in the general population. In 6 of 7 cases, gastrointestinal symptoms had preceded the diagnosis of hyperparathyroidism, and in all cases the symptoms of peptic ulcer disease disappeared after excision of the parathyroid adenoma. All 6 patients who could be followed remained well. The pathogenesis of gastrointestinal ulceration in hyperparathyroidism remains unknown, but it is strongly suggested that patients with refractory peptic ulcers be examined for a possible parathyroid tumor. Some ways in which the hyperparathyroid ulcer patient differs from the average ulcer patient include the marked preponderance of duodenal ulcers among females, the relatively high incidence of gastric ulcers among males, and the absence of gastric hypersecretion.

394 **GEFARNATE AND GASTRODUODENAL ULCERS.** *(Por.)* Siffert, G., Jr. (Gen. Polyclin., Rio de Janeiro, Brazil) and M. F. Gomes Jardim. *Brasil Med.* 81(6):340-343, 1967.

Combined treatment with a bland diet plus gefarnate (geraline farnesylacetate; 100 mg/day i.m. for 30 days) produced both radiological and symptomatic improvement in 18 of 30 peptic ulcer patients; another 10 patients showed either radiological or symptomatic improvement, and 2 showed no change. These results are comparable to those reported in the literature (70% "good" results among 527 cases).

395 **LONG-TERM RESULTS OF HEMIGASTRECTOMY WITH VAGOTOMY IN THE TREATMENT OF BLEEDING PEPTIC ULCERS.** *(E.)* Moghadam, M. (Henry Ford Hosp., Detroit, Mich.) and W. S. Haubrich. *Amer. J. Dig. Dis.* 12(10):1000-1003, 1967.

Among 102 patients subjected to truncal vagotomy plus hemigastrectomy for bleeding peptic ulcers (90 duodenal, 8 gastric, 4 gastroduodenal) in the period 1955-60, only 7 (6.8%) developed recurrent hemorrhage during follow-up period of 6-12 yr (over 8 yr in 80%). The original operation was completed by gastroduodenostomy in 42 cases and by gastrojejunostomy in 60. Among the 7 cases with recurrent bleeding (none of whom required a second operation), 4 had had a gastroduodenostomy and 3 a gastrojejunostomy; in 2 of the latter the bleeding may have been brought on by treatment with aspirin and corticosteroids. In view of these results and the low operative mortality (8 deaths in 162 operations, 5 of the deaths being in emergency cases), truncal vagotomy with gastrojejunostomy is considered to be the surgical treatment of choice for bleeding peptic ulcer.

396 **COMPLICATIONS FROM EXCESSIVELY LONG USAGE OF MILK.** *(Fr.)* Duez, J. C. *Scalpel* 121(5):75-86, 1968.

The prolonged consumption of milk and alkalies, whether by force of habit or for the treatment of peptic ulcer and other gastrointestinal disorders (pyrosis, vomiting), can lead to three principal complications: chronic renal insufficiency (Burnett's syndrome or the "milk and alkali" syndrome), myocardial infarction, and arteriosclerotic cachexia. Thus, a review of the literature shows that peptic ulcer is frequently associated with renal insufficiency, alkalosis and deposits of calcium in the renal tubules, gastric mucosa and lungs. This is particularly true among ulcer patients treated by the Sippy method, and is ascribed to the combination of milk and alkalies; the latter facilitate the absorption of calcium, leading to nephrocalcinosis, reversible renal insufficiency and resultant alkalosis. This syndrome is reversible if administration of a low-protein, low-calcium diet supplemented by anticholinergics, ammonium chloride and nonabsorbable antacids is begun in time. Similarly, myocardial infarction has been observed in 18-36% of ulcer patients treated by the Sippy method, while other ulcer patients show an incidence comparable to that in the general population. This complication is ascribed to the high content of saturated fats and cholesterol in the Sippy diet, factors which are probably also responsible for the generalized arteriosclerosis, hypertension and cachexia seen in other ulcer patients. Finally, it is pointed out that even infants can develop nutritional disturbances if a pure milk diet is continued for too long a time. For the treatment of peptic ulcer disease, it is recommended that the Sippy diet be replaced by a preparation of skim-milk mixed with soya oil and enriched with minerals and vitamins.

397 **PEPTIC ULCER INHIBITING PROPERTIES OF A NEW FRACTION FROM LICORICE ROOT (F_M100).** *(E.)* Ishii, Y. (U. Tokyo, Japan). *Arzneitsmittelforschung* 18(1):53-56, 1968.

The antisecretory properties of F_M100, a fraction extracted from licorice root *(Glyzyrrhiza glabra)* were investigated in 8 pylorus-ligated rats, 18 unanesthetized and urethane-anesthetized rats with acute fistulas, and 14 histamine (0.1 mg/kg s.c.)- and peptone (20% solution)-stimulated dogs anesthetized with phenobarbital (30 mg/kg i.v.). Gastric secretory volume and acid output decreased after intraduodenal injection of F_M100 in pylorus-ligated rats; HCl concentration and pepsin activity were not affected. The onset of F_M100's action was rapid; the action of 400 mg/kg lasted 3 hr, and that of 800 mg/kg lasted 6 hr. The antisecretory activity of F_M100 was about 0.01 that of orally administered atropine sulfate. F_M100 reduced gastric stimulation by methacholine and histamine, but did not affect gastrin stimulation; stimulation by peptone was totally abolished by F_M100. In dogs, F_M100 reduced total HCl output and abolished free HCl output induced by histamine; peptone-induced secretion was also inhibited. The antisecretory effects of F_M100 and atropine sulfate were ynergistically potentiated when the drugs were given together. M100 is thought to block endogenous autonomic mediators, ut not to inhibit parietal cell enzyme production.

98 **A STUDY OF THE EFFECT OF SALIVA ON THE CONCENTRATION OF MUCIN IN GASTRIC UICE AND ITS POSSIBLE RELATIONSHIP TO THE AETIOL-GY OF PEPTIC ULCER.** *(E.)* Malhotra, S. L. (Med. Dept., estern Railway, Bombay, India). *Gut* 8(6):548-555, 1967.

he effect of saliva on gastric juice mucus was studied in 32 ealthy males, aged 17-53 yr. The subjects were divided into 4 roups, 2 groups receiving liquid meals, both intragastrically and rally, and 2 groups receiving 2 types of solid food meals. Some ubjects in the latter 2 groups were given the same meals which ere powdered so that they could be fed by means of an intra-asal gastric tube. Subjects who received food intragastrically ere instructed not to swallow saliva but to eliminate it by fre-uent spitting. Results revealed that free mucus, unless due to ngested saliva, is ordinarily absent from the stomach, and even he entry of food into the stomach does not cause an outpouring f mucus. Free mucus in gastric juice is of salivary origin and is wallowed with food, and varies with the quantity consumed and he manner of eating. There was a close correlation between nucin concentration and the amount of saliva swallowed. A ossible protective role of salivary mucus by augmenting the astric mucus defense barrier is suggested.

99 **DUODENAL ULCERS IN WOMEN.** *(Fr.)* Levrat, M. (Edouard-Herriot Hosp., Lyon, France) . Martin, B. Savoye and R. Lambert. *Arch. Mal. Appar. Dig.* 6(10):931-948, 1967.

00 **FREE PERFORATION OF GASTROJEJUNAL ULCERS AFTER GASTRECTOMY.** *(E.)* Reiss, R. (Meir Hosp., Kfar-Saba, Israel) and C. Antal. *Amer. . Surg.* 114(6):937-940, 1967.

401 **GASTRIC AND DUODENAL ULCERS IN CATS FOLLOWING RESERPINE.** *(E.)* Emas, S. Allmanna Hosp., Malmo, Sweden) and B. Fryo. *Acta Physiol. Scand.* 71(4):316-322, 1967.

402 **STUDY OF GASTRIC SECRETION AFTER "AUGMENTED" HISTAMINIC STIMULATION IN ULCER PATIENTS AND CONTROLS.** *(Fr.)* De La Pierre, M. (U. Med. Clin., Turin, Italy), S. Gabasio and G. Bruno. *Arch. Mal. Appar. Dig.* 56(12):1209-1220, 1967.

403 **MAXIMAL GASTRIC SECRETORY CAPACITY IN GASTRODUODENAL PATHOLOGY.** *(Sp.)* Laudano, O. M. (Centenario Hosp., Rosario, Argentina), S. Gilliavod, O. D. Iglesias, V. Sileo, and H. Vignale. *Rev. Esp. Enferm. Apar. Dig.* 26(8):994-1001, 1967.

404 **GASTRODUODENAL ULCERS AND CORTICO-THERAPY.** *(Sp.)* Berenguer, J. (Fac. Med. Valencia U., Spain), J. Bort and J. Ferrando. *Rev. Esp. Enferm. Apar. Dig.* 26(10):1221-1242, 1967.

405 **CONTRIBUTION TO THE SURGICAL TREATMENT OF THE DUODENAL ULCER BY ELIMINATING GASTRIC RESECTION.** *(Cz.)* Michnevic, I. and B. Vincencova. *Prakt. Lekar.* 45(3):90-92, 1965.. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

406 **REDUCING MORTALITY IN ULCER SURGERY.** *(E.)* Rutledge, R. H. *Texas Med.* 64(2):48-53, 1968.

407 **THE SIGNIFICANCE OF GENETIC AND NON-GENETIC FACTORS IN PEPTIC ULCER.** *(Czech.)* Vesely, K. T. (Inst. Nutr. Res., Prague, Czechoslovakia). *Vnitri Lek.* 13(12):1163-1170, 1967.

408 **A NEW TECHNIQUE FOR PRODUCING STOMACH ULCERS IN WHITE RATS.** *(Fr.)* Djahanguiri, B. (Fac. Med., U. Teheran, Iran), S. Hemati, and F. Behesti. *Arch. Mal. Appar. Dig.* 56(10):985-986, 1967.

409 **MANAGEMENT OF GASTRIC ULCER.** (E.) Tumen, H. J. Pp. 12-16 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson (Eds.). New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

410 **ENDOCRINE-INDUCED PEPTIC ULCER.** *(E.)* Woodward, E. R. Pp. 111-124 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson (Eds.). New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

411 **GASTRECTOMY IN EHLERS-DANLOS SYNDROME.** *(E.)* Pierce, L. E. (Mercy Hosp., Buffalo, N. Y.), M. E. Tyrrell and C. E. Day. *Arch. Surg.* 96(1):95-99, 1968.

412 **IS IT WORTH USING ANTICHOLINERGIC DRUGS IN THE TREATMENT OF PEPTIC ULCERS? – TESTING OF A NEW DRUG – HETERONIUM BROMIDE.** *(Por.)* de Paula Castro, L. (Minas Gerais Med. Clin., Brazil) and H. Pereira Rezende. *Rev. Assoc. Minas Gerais* 18(1):11-16, 1967.

413 **CLINICAL STUDY OF THE SECRETORY PATTERN AFTER MAXIMAL HISTALOG STIMULATION IN PATIENTS WITH POSTOPERATIVE ULCERS.** *(Por.)* Zaterka, S. (U. Sao Paulo, Brazil), A. C. Torres da Costa, W. Phobus Rothstein, and D. Pfuhl Neves. *Arq. Gastroenterol.* 4(4):285-294, 1967.

414 **THE FREQUENCY OF ACUTE PERFORATED PEPTIC ULCER IN DIFFERENT POPULATION GROUPS IN ISRAEL.** *(Heb.)* Lazarus, S. (Tel-Hashomer Govt. Hosp., Israel) and M. Modan. *Harefuah* 72(4):155-157, 1967.

415 **BIOLOGICAL-PSYCHOLOGICAL-SOCIAL FACTORS IN GENESIS OF PEPTIC ULCER.** *(E.)* Ontaneda P., M. *Amer. J. Proctol.* 19(1):55-60, 1968.

416 **HEMORRHAGIC DUODENAL ULCER AND CRANIAL INJURIES.** *(Fr.)* Lasserre, J., G. Gillardeau, Riemens, J. P. Cardinaud and G. Saint-Supery. *Bordeaux Chir.* 4:204-207, 1967.

417 **GASTRIC ULCERS SIMULATING INTRAMURAL, EXTRAMUCOSAL TUMORS: REPORT OF THREE CASES.** *(E.)* Linsman, J. F. (UCLA Sch. Med., Los Angeles, Calif.). *Amer. J. Roentgen.* 101(2): 421-424, 1967.

418 **A CASE OF BENIGN DUODENAL TUMOR FOLLOWING GASTRECTOMY.** *(Fr.)* Van Lerberghe, R. (Cesar de Paepe Clin., Brussels, Belgium) and C. Henry. *Acta Gastroent. Belg.* 30(5/6):460-464, 1967.

419 **EFFECT OF WATER TEMPERATURE ON THE INCIDENCE OF GASTRIC ULCERS INDUCED BY THE SWIMMING METHOD.** *(Fr.)* Djahanguiri, B. (Fac. Med., U. Teheran, Iran). *Med. Pharmacol. Exp.* 17(4):355-358, 1967.

See also abstract nos.: 103,109,182,298,309,311,312

Regional Enteritis

420 **ANGIOGRAPHY IN CROHN'S DISEASE OF THE SMALL BOWEL AND COLON.** *(E.)* Lunderquist, Allan (Central County Hosp., Angelholm, Sweden), Anders Lunderquist and H. Knutsson. *Amer. J. Roentgen.* 101(2):338-344, 1967.

Selective mesenteric arteriography in 14 cases of Crohn's disease permitted more complete delineation of the extent of disease than did conventional barium studies. In 8 cases the superior and inferior mesenteric arteries were visualized, in 5 cases investigation was confined to the superior mesenteric artery and in one case to the inferior mesenteric artery. Selective arteriography also permitted the reliable distinction of early from late disease, as well as fully developed Crohn's disease of the colon from ulcerative colitis.

421 **FREE PERFORATION IN REGIONAL ENTERITIS.** *(E.)* Kyle, J. (Dept. Surg. Path., U. Aberdeen, Scotland), T. Caridis, T. Duncan and S. W. B. Ewen. *Amer. J. Dig. Dis.* 13(3):275-283, 1968.

Four cases of free perforation in regional enteritis are presented which in connection with a review of cases from the literature show that perforation can occur at any age and during different stages of disease; probably it takes place in a variety of manners. The first case was an elderly female (age 60 yr) whose perforation occurred in the thickened wall of the ileum. The only male (age 24) had his perforation on the antimesenteric border (as in the other patients) but in a piece of ileum showing only edema without thickening. Cases 3 and 4, both females (age 22 yr) probably had their perforations in the hospital. In Case 3 there were 2 perforations, 1 being on the outer aspect of the cecum. In Case 4 the perforation proved to be fatal; she was the only one of the 4 who had received corticosteroids during the last 6 months. Perforation is not an infrequent complication of regional enteritis; 95 cases have now been recorded.

422 **BIOPSIES OF LARGE BOWEL IN REGIONAL ENTERITIS.** *(E.)* Anderson, F. H. (Vancouver Gen. Hosp., Canada) and A. Bogoch. *Canad. Med. Ass. J.* 98(3):150-153, 1968.

Rectal and colonic biopsy specimens taken during sigmoidoscopy from 30 patients (16-67 yr of age) with Crohn's disease of the small bowel were histologically examined; the mucosa was usually normal or slightly hyperemic and edematous. Mild nonspecific inflammation was found in 13 patients; inflammatory cells consisted of lymphocytes, plasma cells and eosinophils. One of these patients showed acute inflammation with crypt abscesses which bore no relationship to the severity of the clinical symptoms. The rectal histological findings presented by Crohn's disease are similar to those seen in mild idiopathic ulcerative colitis. Before idiopathic colitis is diagnosed on the basis of large bowel biopsy, the small bowel should be radiographically examined for regional enteritis.

423 **MANAGEMENT OF RECURRENT REGIONAL ENTERITIS.** *(E.)* Bockus, H. L. Pp. 161-169 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson. (Eds.). New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

424 **SMALL BOWEL PERFORATION IN REGIONAL ENTERITIS.** *(E.)* Waye, J. D. (Mt. Sinai Hosp. Serv., City Hosp. Ctr., Elmhurst, N. Y.) and C. Lithgow. *Gastroenterology* 53(4):625-629, 1967.

Malabsorption

425 THE EFFECT OF A GLUTEN-FREE DIET ON THE ABSORPTION OF FOODSTUFFS IN NON-TROPICAL SPRUE. *(Ger.)* Kasper, H. (Med. Clinic, Justus Liebig U., Giessen, Germany). *Gastroenterologia* 108(5):239-251, 1967.

The absorption of fat, glucose, sucrose, lactose, iron, magnesium, carotene, and vitamins A, B_1 and C was estimated before and during treatment with a gluten-free diet in a 28-yr-old woman with idiopathic gluten-sensitive steatorrhea. Before treatment, the patient showed abnormally low absorption of all of the above factors except magnesium. During treatment, the fat absorption coefficient increased from 10% to 68% in 15 days and to 89% in 140 days, and there were regular increases in body weight and the serum levels of carotene and vitamin A. By the end of the 140-day treatment period, the absorption of all the above factors except thiamine and ascorbic acid were well within normal limits, and these were at the lower limits of normal. The absorption of vitamin A and carotene responded most rapidly, while lactose was the last of the sugars to show normal absorption.

426 BOVINE MILK PROTEIN-INDUCED INTESTINAL MALABSORPTION OF LACTOSE AND FAT IN INFANTS. *(E.)* Liu, H. Y. (U. Mich. Med. Sch., Ann Arbor, Mich), M. U. Tsao, B. Moore and Z. Giday. *Gastroenterology* 54(1):27-34, 1968.

Four full-term infants, ages 2½ to 9 months, presented vomiting, diarrhea, electrolyte and water depletion, and failure to gain weight on bovine milk formulas. Oral lactose tolerance curves were flat. Taken off bovine milk diets for 1 to 7 months, the patients gained weight. After complete remission, the patients were hospitalized for this study. They were fed a "baseline" formula calorically approximating cow's milk, but containing nonbovine protein and dextrose, substitutable at will for lactose. Initially, all infants were fed the dextrose formula ad libitum, supplemented with calcium and vitamins. Oral lactose tolerance curves and 72-hr fecal fat determinations were obtained during feeding with the dextrose formula; during substitution of lactose for the dextrose; and during feeding with bovine milk protein in the form of whole cow's milk or in the form of the dextrose formula with bovine protein (serum albumin and globulin, beta-lactoglobulin, and alpha-lactoalbumin) added. During feeding with the cow's milk formula, the maximum rise in plasma glucose after lactose loading was 15-35 mg/100 ml. This rose to 60-96 mg/100 ml during feeding with the baseline formula and was the same when lactose was substituted for dextrose. The glucose rise decreased significantly when bovine milk protein was substituted before the tolerance test. During remission, stool wet weight ranged from 31 to 63.3 g/24 hr, with no significant difference between dextrose and lactose diets. During milk protein feedings there was a 2- to 4-fold increase in daily wet weight of stools. Carbohydrate intake did not account for observed changes in fecal water. The percentage of fecal fat rose from 10.75% to 22.75% when whole milk feedings were substituted for lactose feedings. Substitution of lactose for dextrose in baseline formulae produced no change in clinical signs after remission, but feeding with selected milk protein did. Thus it seems that in certain human subjects, it is the protein, not the carbohydrate, in cow's milk that precipitates intestinal malabsorption.

427 EVIDENCE OF VITAMIN E DEFICIENCY IN PATIENTS WITH MALABSORPTION OR ALCOHOLISM AND THE EFFECTS OF THERAPY. *(E.)* Losowsky M. S. (Gen. Infirmary, Leeds, England) and P. J. Leonard. *Gut* 8(6):539-543, 1967.

The effects of vitamin E supplementation were studied in 11 pa tients with vitamin E deficiencies secondary to malabsorption and malnutrition. Except for 1 patient on a low fat diet and 3 patients with prolonged poor dietary intake due to alcoholism, all patients were on normal diets. Fecal fat determinations wer made for 7 days. Plasma vitamin E levels were estimated by th Martinek method. Urinary creatine and creatinine were determined in 24-hr urine specimens by the Varley technique. One hundred mg of alpha-tocopherol was given orally and intramuscularly twice a day for 7 days, and then only orally twice a da until the end of the study. Alpha-tocopherol administration raises plasma vitamin E levels, decreases urinary creatine excretion, and returns the abnormal hydrogen peroxide hemolysis te to normal in vitamin E-deficient patients. Human vitamin E de ficiency is similar to dietary vitamin E deprivation in experime animals.

428 ABSORPTION OF LACTOSE AND ITS DIGESTI PRODUCTS IN THE NORMAL AND MALNOUR ISHED UGANDAN. *(E.)* Cook, G. C. (Royal Free Hosp., London, England), A. Lakin and R. G. Whitehead. *Gut* 8(6): 622-627, 1967.

Lactose absorption and lactase deficiency were studied in 18 fasted patients of different Ugandan tribes; 13 (aged 1-23 yr) showed no clinical evidence of malnutrition or gastrointestinal disease, and 5 (aged 14-26 months) had kwashiorkor. Lactose and glucose-galactose tolerance tests were performed, and capillary blood and jejunal content were sampled every 30 min for hr. Lactase deficiency and poor lactose absorption were confirmed in normal Bagandan subjects. The Kwashiorkor patient showed less severe impairment of lactose absorption and only small amounts of lactic acid and total reducing substances wer found in the stool. A good correlation was seen between max mum blood glucose rise and percentage absorption of carbohy during oral lactose and glucose + galactose tolerance tests.

429 NEUROMUSCULAR DISEASE IN PATIENTS WITH STEATORRHOEA. *(E.)* Binder, H. J. (Yale U. Sch. Med., New Haven, Conn.), G. B. Solitare and H. Spiro. *Gut* 8(6):605-611, 1967.

Neurological and myopathic disorders were present in 4 patien with refractory steatorrhea. In 3 of the patients the neurologi symptoms were severe, progressive and irreversible. Gluten-fre diets led to temporary remissions in 2 patients; but severe diar rhea subsequently recurred. Microscopic examinations of inte tinal mucosa of 2 patients revealed shortened villi with increas crypt height. Skeletal muscle in 2 patients was characterized marked variations in muscle fiber size, proliferation of sarcole mal nuclei, and occasional vacuolization of muscle fibers. A patohy demyelinization of peripheral nerves was seen in two c Neuromuscular disorders can occur in patients with steatorrhe and steatorrhea should be looked for in any patient with an u explained sensory deficit or muscular weakness.

430 **CORRECTABLE INTESTINAL DEFECT OF VITAMIN B_{12} ABSORPTION IN PERNICIOUS ANEMIA.** *(E.)* Carmel, R. (Mt. Sinai Hosp. Med. Sch., New York, N. Y.) and V. Herbert. *Ann. Intern. Med.* 67(6): 1201-1207, 1967.

Of 10 successive patients with pernicious anemia and no evidence of coincident intestinal disease, intestinal malabsorption of vitamin B_{12} was found in 4 (in addition to evidence of malabsorption of other substances). Three of these patients were restudied after periods of vitamin B_{12} therapy ranging from 1-10 months, and all had correction of the intestinal B_{12} absorptive defect (as well as of absorption of some other substances). In the two patients whose gastric juice was reexamined several yr after starting B_{12} therapy, intrinsic factor was still absent. The third patient still lacked intrinsic factor also, as manifested by abnormality of her Schilling test without added intrinsic factor. These findings suggest that B_{12} deficiency frequently produces ileal mucosal damage, often sufficient to grossly reduce B_{12} absorption, and that B_{12} therapy corrects this damage.

431 **EFFECT OF INCREASED DIETARY FAT INTAKE IN PATIENTS AFTER RESECTION OF THE SMALL INTESTINE AND MALABSORPTION OF DIFFERENT AETIOLOGY ON FAECAL FAT EXCRETION.** *(E.)* Skála, I. (Inst. Human Nutrition, Prague, Czechoslovakia), A. Krondl, M. Vulterinová, J. Horáčková and R. Sťastná. *Gastroenterologia* 108(6):297-308, 1967.

Fat and nitrogen balance studies were performed on 38 hospitalized patients suffering from or suspected of suffering from malabsorption. Included were 11 subjected to gastrectomy and 13 who had undergone resection of the small intestine. After a 3-day preparatory period, each subject was studied during two 5-day periods on a diet which daily provided 80 or 120 g of fat (butter), resp. On 80 g of fat/day, no steatorrhea was found in any patient with resection of small intestine of less than 1 meter. On 120 g of fat/day, there was an increased utilization of ingested fat regardless of the extent and site of resection. The higher intake of fat in the form of fresh butter was well tolerated by most of the patients with steatorrhea regardless of the etiology of malabsorption. In all cases there was an increase in caloric intake. Fat utilization on the higher intake was significantly worse in patients with severe steatorrhea. The increased fat intake did not alter fecal nitrogen content and nitrogen balance.

432 **FRUCTOSE-1-PHOSPHATE ALDOLASE AND FRUCTOSE 1-6-DIPHOSPHATE ALDOLASE. ACTIVITY IN THE MUCOSA OF THE INTESTINE IN HEREDITARY FRUCTOSE INTOLERANCE.** *(E.)* Nisell, J. (Mora Hosp., Mora, Sweden) and L. Lindén. *Scand. J. Gastroenterology* 3(1):80-82, 1968.

Small intestine biopsies of 2 patients from the same family with hereditary fructose intolerance showed fructose-1-phosphate aldolase activities which were less than 10% of that found in biopsy specimens from 7 normal subjects who were without any intestinal abnormalities. In the patients, activity of fructose-1-6-diphosphate was normal.

433 **MALABSORPTION IN YOUTH.** *(E.)* Baker, W. G., Jr. (St. Petersburg Med. Clinic, Fla.) and M. H. Sleisenger. *Southern Med. J.* 61(3):297-302, 1968.

A brief review is presented of a number of chronic diseases in which there is malabsorption as well as other gastrointestinal complications. In mucoviscidosis malabsorption of fat, carbohydrate, protein, and fat-soluble vitamins is present in over 80%; other abnormalities include decreased duodenal volume and pH, ileal atresia or meconium ileus, and rectal prolapse. Evidence for the hypothesis that celiac disease is due to a local mucosal hypersensitivity reaction is found in the beneficial effect of steroid therapy (which may inhibit antigen-antibody interaction), and in finding increased numbers of plasma cells in jejunal biopsies of untreated patients, with striking reduction following dietary gluten restriction. Malabsorption of disaccharides and monosaccharides can lead to many varied symptoms in a variety of gastrointestinal disorders. Investigation of patients with excessive loss of plasma protein into the gastrointestinal tract has led to the elucidation of a number of previously unrecognized disorders. While the allergic etiology of this syndrome has not been accepted without reservation, it is recognized that a syndrome of edema, extreme hypoproteinemia, anemia, eosinophilia, and growth retardation in young children may be dramatically improved by milk restriction or glucocorticoid therapy.

434 **COMPOSITION OF FECES IN STEATORRHEA OF DIFFERENT ETIOLOGY: MUTUAL RELATIONSHIP BETWEEN THE VOLUME OF FECES, WATER, DRY MATTER, NITROGEN, AND FAT CONTENT.** *(E.)* Skala, I. (Inst. Human Nutrition, Prague, Czechoslovakia), A. Krondl, M. Vulterinová, R. Šťastná, H. Vavrinkova, J. Horáčková and V. Parikova. *Amer. J. Dig. Dis.* 13(3):204-212, 1968.

Metabolic balance studies were performed on 19 hospitalized controls and 96 patients with previously diagnosed steatorrhea or who were admitted because steatorrhea was suspected. This group of 96 included 42 with previous gastrectomy, 35 with previous small intestine resection, 11 with pancreas disease, and 9 with mucosal pathology. Values found relating to fecal total volume, water content, dry matter and nitrogen/24 hr are in keeping with data reported in the literature. There was a positive correlation between the amount of fat excreted/24 hr and the amount of feces, water content, dry matter, and nitrogen content regardless of the etiology of the steatorrhea. There was a higher content of water after resection of the ileocecal region. There is a close correlation between the weight of the dry matter and the amount of nitrogen. Azotorrhea can be detected and its severity determined with considerable accuracy from the increased content of dry matter in the feces. A dry matter content exceeding 50 gm/24 hr indicates that steatorrhea is very probably present. By calculation of partial correlations it was found that changes in fecal fat and nitrogen excretion are mutually independent, although there exists a positive correlation between them. The concurrent estimation of the dry matter content and fecal fat losses renders the diagnosis of steatorrhea more accurate and helps to eliminate errors caused by faulty methods. Because no differences were found in the composition of feces or in correlations between etiologically different groups of steatorrhea (including the pancreatogenic type), the estimation of the volume, water, dry matter, and nitrogen content do not contribute to the differential diagnosis.

435 **LACTASE DEFICIENCY IN ORIENTALS.** *(E.)* Chung, M. H. (U. Minnesota, Rochester) and D. B. McGill. *Gastroenterology* 54(2):225-226, 1968.

Lactase deficiency was found in 11 Oriental subjects (aged 23-39 yr) given 50 g lactose loads. Histological examination of small intestinal biopsy specimens revealed no abnormalities. The incidence of lactose intolerance suggests that genetic rather than environmental factors are responsible for the results.

436 **PROTEIN-LOSING ENTEROPATHY ASSOCIATED WITH GASTROINTESTINAL ALLERGY.** *(E.)* Greenberger, N. J. (Ohio State U. Coll. Med., Columbus), J. I. Tennenbaum and R. D. Ruppert. *Amer. J. Med.* 43(5): 777-784, 1967.

437 **A CASE OF MALABSORPTION SYNDROME DUE TO INFECTIOUS JEJUNITIS.** *(It.)* Ferri, S. (Inst. Gen. Clin. Med. & Med. Ther., U. Bologna, Italy), L. Sammarro and P. Azzaroli. *Riv. Gastroent.* 29(2): 94-106, 1967.

438 **PROGRESS IN GASTROENTEROLOGY: TROPICAL SPRUE.** *(E.)* Klipstein, F. A. (Coll. Phys. and Surg., Columbia U., New York City). *Gastroenterology* 54(2):275-293, 1968.

439 **ADULT HYPOGAMMAGLOBULINEMIA WITH MALABSORPTION AND IRON DEFICIENCY ANEMIA.** *(E.)* Johnson, R. L. (U. Washington Sch. Med., Seattle), P. P. Van Arsdel, Jr., A. D. Tobe and Y. Ching. *Amer. J. Med.* 43(6):935-943, 1967.

See also abstract nos.: 62,115,302,303

LARGE INTESTINE

40 **THE SURGICAL TREATMENT OF VILLOUS TUMORS.** *(Fr.)* Loygue, J. and M. Malafosse. *rch. Mal. Appar. Dig.* 56(9bis):57-66, 1967.

ome of the problems in the surgery of villous tumors are disussed, based on the authors' experience in treating 79 such tuiors of the rectum and sigmoid from 1951 to 1967. Excluding ancerous or polypoid tumors and tumors treated by electrocogulation or diathermy there remain 56 pediculated or sessile arrow-based tumors and 15 flat tumors with a more or less cirumferential development. The surgical problems discussed are rimarily related to the anatomical characteristics of these umors, their recurrent nature, and the difficulty of establishing enignancy or malignancy from biopsy specimens. Of 63 small nd medium tumors, 43 were treated by local extirpation (37 ransanally and 6 transabdominally) and 20 by rectocolectomy.)f 7 cases of "villous disease", 5 were treated by extensive and by local resection. Finally, there were 15 recurrences in 8 atients who all initially had flat tumors. The recurrences were etermined to be malignant in 3 cases and benign in 12, and vere treated by local excision (6), abdominoperineal amputation 2), Whitehead's operation (3) or Babcock's operation (4). Depite the admitted known risk of insufficiently treating an unecognized malignancy, the authors' general approach is conervative.

41 **CHANGES IN BLOOD CHEMISTRY AND ELECTROLYTE BALANCE DURING THE)EVELOPMENT OF VILLOUS TUMORS.** *(Fr.)* De Jode, L. R. *rch. Mal. Appar. Dig.* 56(9bis):67-70, 1967.

iochemical studies of 4 women (aged 53-82) with benign villous denomas of the large intestine revealed uremia in 3; hypokalemia n 3; hyponatremia, hypochloremia and metabolic acidosis in 2; nd increased potassium in the tumor mucosa of 2. These abormalities, along with general dehydration, weakness, and somiolence common to all the patients presented, disappeared after uccessful treatment (surgical resection in 3 cases and repeated iathermy in one). The diagnosis and possible pathogenesis (seretion of water, sodium, and potassium by the tumor mucosa) re discussed.

42 **A REPORT OF FOUR CASES OF CROHN'S DISEASE OF THE COLON.** *(Fr.)* Geffroy, Y. Charles Nicolle Hosp., Rouen, France), R. Laumonier, U. Iarel, P. Jouanneau, J. Bourreille, M. Segrestin, A. Fondimare, . Hernandez, J. Fablet and G. Cayron. *Arch. Mal. Appar. Dig.* 6(11):1037-1068, 1967.

he incidence, digestive and general symptoms, histopathology, ourse, etiology, differential diagnosis (based on radiology, rectoigmoidoscopy and other laboratory procedures), nomenclature nd treatment of Crohn's disease of the colon are discussed in etail based on four personal cases and a review of the literaure. Emphasis is given to anal lesions and to radiological and natomopathological findings, which are used to clarify the reationship between Crohn's colitis and regional ileitis. Crohn's lisease of the colon is characterized by segmental distribution of the lesions with marked anal and perianal involvement, a endency to fistula formation, and a chronic or recurrent course. Iacroscopically, there is parietal thickening, longitudinal ulceration and transverse crevasses running between isolated swollen areas. Microscopically, the disease is characterized by submucosal edema with involvement of the subserosa, frank or equivocal fistulas, and epitheloid or giant-cell granulomas. These lesions can be radiologically detected and accurately diagnosed by selective angiography. The etiology of this disease is unknown. That it is related to Crohn's ileitis rather than to ulcerative colitis *per se,* has not been definitely established but seems likely. In view of the importance of the anal lesions, however, "Crohn's proctocolitis" might be a better term.

443 **TECHNIQUE FOR THE RESECTION OF EXTENSIVE VILLOUS PAPILLOMAS OF THE LOWER RECTUM.** *(Fr.)* Parks, A. G. (London Hosp., England). *Arch. Mal. Appar. Dig.* 56(9bis):89-100, 1967.

The basis of the technique described is the separation of the tumor mucosa from the circular intestinal musculature by the submucosal injection of isotonic saline containing epinephrine (1/250,000), after which the tumor can be dissected out. Suture of the mucosa is unnecessary in the case of small tumors, and colostomy is never required for benign tumors, even if they occupy the entire lumen of the rectum. The papilloma must be verified as benign, however, and if the entire rectal mucosa is excised a new mucosa must be brought down from the colon to prevent stenosis.

444 **CHANGES IN THE GENERAL CONDITION DURING THE DEVELOPMENT OF VILLOUS TUMORS OF THE RECTUM AND SIGMOID.** *(Fr.)* Levrat, M., J. Pasquier and B. Moulinier. *Arch. Mal. Appar. Dig.* 56(9bis):71-88, 1967.

Two types of general complications arise during the course of villous intestinal tumors: the nonspecific complications associated with any chronic lesion of the digestive tract, and characteristic changes stemming from severe disturbances in water and electrolyte balance due to massive elimination of mucoid feces. In a review of 88 cases from the literature, it is pointed out that the latter type of complications often appear suddenly and in a severe form after a prolonged history of neglected intestinal disturbances. They may include mental disturbances, muscular paresis, dehydration, and collapse, and are apparently due to loss of sodium, chlorides, and especially potassium, and often by marked uremia. Correct diagnosis of these syndromes can be difficult and time-consuming. Immediate rehydration and administration of electrolytes are essential, but lasting cure can only be achieved by excision of the tumor. The drop in serum electrolyte levels is ascribed to the secretion of excessive amounts of water and electrolytes by the tumor mucosa, especially in the case of extensive villous tumors situated low in the intestine. There are 101 references.

445 **TREATMENT OF VOLVULUS OF SIGMOID COLON: A REVIEW OF 425 CASES.** *(E.)* Shepherd, J. J. (Dept. Surg., Makerere U. Coll., Kampala, Uganda). *Brit. Med. J.* 1(5587):280-283, 1968.

During the period 1949-65 a total of 425 cases of sigmoid volvulus were treated at Mulago Hospital by more than 30 surgeons of varying seniority and experience. In 9 cases there was spontaneous remission or response to enema. Sigmoidoscopy and intubation was successful in 78 of 89 cases. Laparotomy and detorsion without fixation was carried out in 49 patients and resulted in 8 deaths (16%). This relatively high mortality was related to the fact that these patients deteriorated rapidly after laparotomy and the briefest procedure was therefore employed. Laparotomy with fixation was used in 213 cases and there were 17 deaths (8%). Volvulus recurred in 41% of the 195 patients discharged alive. Resection (end-to-end anastomosis, exteriorization, Hartmann's operation) was carried out in 65 cases with 16 deaths (25%). In 30 cases this was mandatory because of gangrene; there were 11 deaths (38%). In the series as a whole there were 2 operative deaths and in 7 cases patients were moribund on admission and died before definitive treatment could be given. In all, there were 50 deaths; 17 deaths involved gangrene of the bowel.

446 SURGICAL MANAGEMENT OF VILLOUS TUMORS OF THE COLON AND RECTUM. *(E.)*

Cogan, J. E. (Houston, Texas). *Dis. Colon Rectum* 11(1):64-66, 1968.

The proper surgical procedure for excision of villous tumors of the colon and rectum depends on the patient's age, tumor size, site, number and extent of the tumors, gross appearance and microscopic structure. The cases of 163 villous tumor patients were evaluated. The most common symptoms were rectal bleeding and pressure, and excessive mucus discharge. The majority of tumors were situated in the rectum; the second most common site was the sigmoid flexure. Lesions involving the anterior and posterior walls were equally divided. Of 173 tumors found, 125 were benign and 48 were malignant. Biopsy and fulguration were performed in 73 elderly patients, who were considered poor surgical risks; all but 1 had benign tumors. Recurrence rate was 17%. Intrarectal excision was performed in 34 patients with large prolapsed benign tumors: recurrence rate was 20%. Radical resection was done in patients considered good surgical risks who had definite cancer and in patients with large villous tumors which were untreatable by the other methods: recurrence rate was 3%. Colotomy and polypectomy was used in 2 instances where the patients could not tolerate more radical surgical procedures.

447 CRYOTHERAPY FOR INOPERABLE RECTAL CANCER. *(E.)*

Gage, A. A. (Vet. Admin. Hosp., Buffalo, N. Y.). *Dis. Colon Rectum* 11(1):36-44, 1968.

Cryotherapy was used for palliation of symptoms in 7 patients (aged 68-89 yr) with inoperable rectal cancer and in one with perineal recurrence of cancer after abdominoperineal resection. All but 1 patient showed bleeding from the rectal tumor, 2 were admitted with rectal obstruction and 2 developed obstruction after admission to the hospital. Cryosurgery decreased or entirely suppressed bleeding, relieved tenesmus, pain and rectal obstruction, and obviated colostomy in all patients. The patient with perineal recurrent pelvic cancer presented a difficult problem and benefits of freezing were not easy to assess. When cryotherapy leads to palliation, benefits are related to reduction in the bulk of the tumor.

448 CONCEPTS REGARDING POLYPOSIS OF THE COLON. *(E.)*

Turcot, J. (L'Hotel-Dieu De Quebec Hosp., Canada), H. Blanchard and D. Wolff. *Dis. Colon Rectum* 11(1):9-16, 1968.

Eleven polyposis patients were separated into 2 groups, according to age, to determine whether or not a familial link existed. The younger group, which comprised 4 teenagers, represents true familial polyposis: 2 patients were siblings while 2 had no proven familial relationship. All 4 had diffuse polyposis and malignant transformation into carcinoma; multiple carcinomas occurred in 2. Marked inflammatory reaction, combining lymphoid follicle hypertrophy with lymphocyte and plasma cell infiltration was observed. Polyp recurrence during treatment was noted in all patients. Associated malignant tumors of the CNS caused the death of the 2 patients with proven familial polyposis. The second group consisted of 7 patients, aged 40-80 yr. Cancer of the colon was reported in the families of 3. Segmental polyposis occurred in 3, and diffuse polyposis in 4. All had invasive bowel carcinoma involving the cecum or sigmoid flexure or both. Histological examinations disclosed mild inflammatory reaction in all but 1 patient; this patient exhibited marked lymphoid follicle hypertrophy. The genetic link of polyposis is confirmed in patients under 40 yr of age belonging to the same family. In patients over 40, polyposis has the same basis as carcinoma of the colon and should be called primary multiple polyposis of the colon.

449 DIVERTICULAR DISEASE OF THE RIGHT COLON. *(E.)*

Peck, D. A. (Queen's Hosp., Honolulu, Hawaii), R. Labat and V. G. Waite. *Dis. Colon Rectum* 11(1):49-54, 1968.

One hundred and eight patients, mostly Oriental, aged 19-87, underwent surgery for complications of right colon diverticulitis. Indications for surgery were acute diverticulitis (54), chronic diverticulitis (43), hemorrhage (6), and small bowel obstruction (1). Exploration was done in 10 patients. Diverticulectomy, mass excision, internal marsupialization and diverticulum drainage were performed in 22 patients with acute diverticulitis. Diverticulum inversion was done in 3 patients with chronic diverticulitis; 5 patients underwent diverticulectomy. Colon resection was employed most frequently. Emergency colectomy was performed in 28 acute diverticular disease cases: 3 underwent segmental colectomy, 7 right proximal colectomy, and 18 right hemicolectomy. Chronic diverticulitis was treated with proximal right hemicolectomy in 5 cases, and segmental colectomy in 1 case. Right hemicolectomy was performed in 27 patients; 1 had had diagnostic colotomy before resection. Right hemicolectomy was also done in 5 hemorrhagic patients with multiple diverticula and 1 patient with small bowel obstruction. Diverticulitis was pathologically confirmed in 78 patients; pericolonic inflammation was diagnosed in 9; and diverticulosis without diverticulitis was found in 8 cases. There was no postoperative mortality. In Hawaii, right colon diverticulitis with multiple diverticula occurred mostly in the 40-yr-old Oriental.

450 FAMILIAL MULTIPLE POLYPOSIS: RESEARC TOOL FOR INVESTIGATING THE ETIOLOGY OF CARCINOMA OF THE COLON? *(E.)*

Smith, W. G. (El Paso Med. Ctr., Tex.). *Dis. Colon Rectum* 11(1):17-31, 1968.

ight case histories are presented associating colonic polyposis vith various neoplastic manifestations. A causal relationship etween multiple polyposis and epithelial tumors in general nd endocrine gland tumors in particular. Small osteomas were een in 2 cases. While 3 of the cases were members of one amily (2 brothers and the mother), family history was negative r inadequate. The author rejects the many syndromes which ave been advanced to explain the manifestations of patients vith familial multiple polyposis in favor of his own unified oncept of the disease based on his own experience and his onclusions from the work of others. He proposes that a single nutant gene is responsible for the predominantly neoplastic endencies evident in familial multiple polyposis; this gene produces its effects by one of two mechanisms: 1) By causing laboration of a carcinogenic growth-stimulating molecule which s abnormal either in the amount produced or in its basic chemical properties, or 2) by fundamentally altering nuclear material, ausing cells all over the body to respond more vigorously to he growth stimuli which normally impinge on them from extraneous sources. Familial multiple polyposis should be thought of as a molecular disease in the same sense as many other genetically determined diseases. Programs for further research on his condition are offered.

451 DIVERTICULITIS OF THE ASCENDING COLON. *(E.)* Bahabozorgui, S. (Grad. Hosp., U. Pennsylvania, Philadelphia), W. E. DeMuth, Jr. and W. S. Blakemore. *Amer. J. Surg.* 115(3):295-300, 1968.

Experience with 11 cases of acute cecal diverticulitis is presented; 4 unusual cases are given in some detail. Inaccurate preoperative diagnoses led in some instances to unnecessarily extensive operations. One patient with multiple diverticula in the ascending and descending colon underwent colonic resection and died. In 3 cases the lesion was excised; 6 underwent colonic resection, and one underwent inversion of the diverticulum. One patient was handled medically and was discharged in 2 weeks. Uncertainty of diagnosis at operation in this relatively rare condition frequently results in major colonic resections, although simple excision of the diverticulum is the procedure of choice. When right lower quadrant pain, tenderness, or mass are present, the possibility of cecal diverticulitis should be considered. The most useful diagnostic tool was the barium enema.

452 COLISTIN SULPHATE IN THE TREATMENT OF SPECIFIC BACTERIAL INTESTINAL INFECTIONS. *(E.)* Lamb, R. (Gateside Hosp., Greenock, Scotland). *Scot. Med. J.* 13(1):9-12, 1968.

Eradication was achieved in 39 (81.25%) of 48 cases of specific *Escherichia coli* infection treated with p.o. colistin sulfate. In 45 cases of shigellosis, eradication was affected in 33 (73.3%). In the *E. coli* group daily dose (for 7 days) was 100,000 U/kg for adults and 150,000 U/kg for children. In the *Shigella* group, daily dose (for 8-10 days) was 200,000 U/kg for adults and 300,000 U/kg for children. Since cure was judged on the basis of 6 negative daily dismissal swabs, the results obtained compare very favorably with other antibiotics. Some patients in this study had been treated unsuccessfully by a variety of other agents. The only definite side effect was a generalized erythematous rash which disappeared on withdrawal of drug.

453 OBSERVATIONS ON THE EPIDEMIOLOGY OF APPENDICITIS. *(E.)* Ashley, D. J. B. (Morriston Hosp., Swansea, Wales). *Gut* 8(6):533-538, 1967.

The age-specific incidence of acute appendicitis suggests that it is a disease restricted to a carrier subpopulation. The onset of the disease requires the accumulation in an individual of at least 2 discrete changes which are random in character and the recurrence probability of which is constant in time. One of these changes may be related to diet, since there is an observed variation in incidence of appendicitis in different parts of the world, and which may be associated with differences in genetic status or dietary and culinary habits. It is inferred that in either sex 12% of the population is susceptible to appendicitis. Appendectomy is mostly performed on persons 20 yr of age or younger. The majority of nonacute appendicitis patients are pubertal and menopausal females; it is suggested that the pain in these patients originates in the genital organs. A study showed that there are differences in disease incidence between Welsh and non-Welsh people of Wales and that there is an excess of stomach cancer, prostatic hyperplasia, and coronary artery disease which can be explained, in part, by differences in the gene pools of the Welsh and non-Welsh. Study of the seasonal incidence of the disease shows a preponderance of cases of acute appendicitis in the spring but no seasonal variation in nonacute appendicitis. It is suggested that some extrinsic agent, possibly a virus or allergen, may be responsible for the high frequency of acute appendicitis during the months of February to May.

454 PRIMARY SCIRRHOUS CARCINOMA OF COLON: ROENTGENOLOGIC DIAGNOSIS. *(E.)* McQueeney, A. J. (St. Francis Hosp., Santa Barbara, Calif.), R. W. Olson and A. Medwid. *Amer. J. Roentgen.* 101(2):306-310, 1967.

Many of the clinical and roentgenologic features of primary scirrhous carcinoma of the colon were illustrated by the case of a young housewife (age 24) whose tumor was fatal less than 1 yr after onset. Typically a long segment is involved. There is some retrograde obstruction to the flow of barium. There also is absence of an intraluminal mass, and usually, absence of mucosal ulceration.

455 THE MERIT OF SELECTIVITY IN THE SURGICAL MANAGEMENT OF CONGENITAL MEGACOLON (HIRSCHSPRUNG'S DISEASE). *(E.)* Gennaro, A. R. (Temple U. Med. Ctr., Philadelphia, Pa.) and H. E. Bacon. *Dis. Colon Rectum* 11(2):91-96, 1968.

In the selection of the most appropriate and simplest procedure for the correction of different patterns of megacolon, it is stressed that roentgenologic study, careful observation during surgery, and serial biopsies are essential. With precise location and knowledge of the extent of the area of aganglionosis, a sound basis is provided for the proper selection of the type of operation that should be employed.

456 FOCAL ULCERATIONS OF THE COLON IN GRANULOMATOUS COLITIS. *(E.)* Goldberg, H. I. California Sch. Med., San Francisco). *Amer. J. Roentgen.* 101(2):296-300, 1967.

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459 A CASE OF SEGMENTARY MUSCULAR STRICTURE OF THE SIGMOID WITH A SINGLE DIVERTICULUM. *(It.)* Greco, V. (U. Rome, Italy), and G. Spaziani. *Chir. Gastroent.* 1(4):510-516, 1967.

460 PSEUDOMYXOMA PERITONEI: AN UNUSUAL COMPLICATION OF AN APPENDIX OBSTRUCTED BY A CARCINOID. *(Por.)* Chaves, E. (Sch. Med., Paraiba U., Brazil). *Arq. Gastroent.* 4(4):337-340, 1967.

461 ANATOMY AND PATHOLOGY OF THE VILLOUS PAPILLOMA. *(E.)* Morson, B. C. (London, England). *Arch. Mal. Apar. Dig.* 56(9bis):33-36, 1967.

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464 MALIGNANT POTENTIAL OF ADENOMA OF COLON AND RECTUM. *(E.)* Enterline, H. T., G. W. Evans, R. Mercado-Lugo, L. Miller and W. T. Fitts, Jr. Pp. 66-67 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson. (Eds.) New York, Hoeber Med. Div. Harper and Row. 319 pp.

465 ONE STAGE RESECTION AND PRIMARY ANASTOMOSIS FOR OBSTRUCTING CARCINOMA OF THE COLON AND IN DIVERTICULITIS. *(E.)* Ferguson, L. K. Pp. 68-76 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson. (Eds.) New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

466 RESECTION OF THE UPPER RECTUM FOR CANCER. *(E.)* Turnbull, R. B. Pp. 77-91 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson. (Eds.) New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

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468 EFFECTS OF SECRETION ON HUMAN RECTAL MUCOSA *IN VITRO*. *(E.)* Johansen, P. G. (Royal Child. Hosp., Melbourne, Australia), B. Hadorn and C. M. Anderson. *Nature* 217(5127):468, 1968.

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479 **SURGICAL TREATMENT OF COMPLICATED SIGMOIDITIS.** *(Fr.)* Larrieu, H. (Broussais Hosp., Paris, France), C. Evrard, E. Pelissier, M. Deligny and F. Poilleux. *Ann. Chir.* 21(25/26):1553-1556, 1967.

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482 **TREATMENT OF SIGMOIDITIS COMPLICATIONS (ON 17 CASES).** *(Fr.)* Verhaeghe, M. (Cité Hospitalière, Lille, France) and J. Blanckaert. *Ann. Chir.* 21(25/26):1563-1564, 1967.

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484 **ACUTE COMPLICATIONS IN DIVERTICULAR SIGMOIDITIS.** *(Fr.)* Hector, A. (Cen. Hosp., Rouen, France). *Ann. Chir.* 21(25/26):1567, 1967.

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494 **ON 17 CASES OF SIGMOIDITIS TREATED SURGICALLY.** *(Fr.)* Lortat-Jacob, J. L. (Beaujon Hosp., Clichy, France), F. Fekete and R. Giuli. *Ann. Chir.* 21(25/26):1591-1592, 1967.

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510 PLEURI-FOCAL DEGENERATION IN A CASE OF MULTIPLE POLYPOSIS OF THE LARGE INTESTINE. *(It.)* Trapain, A., S. Musella and A. Agresti. (Pp. 251-256 in *Arch. Atti Soc. Ital. Chir.* [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965]. Rome, E.M.E.S., 1967. 627 pp.)

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527 **A SIMPLE METHOD OF DIVIDING THE POSTERIOR COLOSTOMY WALL.** *(E.)* Barron, J. (Detroit, Mich.). *Dis. Colon Rectum* 11(1):67-68, 1968.

528 **PRIMARY HODGKIN'S GRANULOMA OF THE SIGMOID FLEXURE.** *(E.)* McNatt, M. (U. Texas Med. Sch., Dallas). *Dis. Colon Rectum* 11(1):55-60, 1968.

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See also abstract nos.: 106,114,120,121,122,180,183,349,422

531 **HYPERCOAGULABILITY ASSOCIATED WITH CHRONIC ULCERATIVE COLITIS: CHANGES IN BLOOD COAGULATION FACTORS.** *(E.)* Lee, J. C. L. (Mayo Clin. and Mayo Grad. Sch. Med., Rochester, Minn.), J. A. Spittell, Jr., W. G. Sauer, C. A. Owen, Jr. and J. H. Thompson, Jr. *Gastroenterology* 54(1):76-85, 1968.

Hypercoagulability was studied in 16 patients with ulcerative colitis in different stages (12 in the active stage, of whom 9 had extensive and 3 had limited bowel involvement; and 4 in the quiescent stage). Liver function tests were normal or minimally abnormal in all but 2 patients tested. Factor VIII activity was abnormally high in 7 out of the 9 patients with extensive bowel involvement. Thromboplastin generation was accelerated in 8 patients, normal in 7 patients and slow in 1 patient. Plasma fibrinogen was normal in 7, and elevated in 8 patients, and depressed in 1 patient. Serial studies show that an improvement in colitis is accompanied by a reduction in fibrinogen. An acceleration of the early stages of coagulation may result in hypercoagulability in more severe ulcerative colitis cases. Accelerated thromboplastin generation and increased factor VIII activity appear to be the result, not the cause, of thrombosis. Observed reduction in vitamin K-dependent clotting factors supports the contention that patients with active ulcerative colitis have a vitamin K deficiency. A possible mild qualitative platelet defect in certain patients is suggested by the finding that abnormal prothrombin consumption is corrected by platelet substitutes.

532 **CLINICAL AND RADIOLOGIC FEATURES OF ULCERATIVE COLITIS.** *(E.)* Lindner, A. E. (New York U. Sch. Med., New York City) and R. H. Marshak. *G.P.* 37(2):111-123, 1968.

Ulcerative colitis primarily involves the left side of the colon and the rectum, although either the entire colon or the rectum alone may be affected. In total colon involvement, 33% will have terminal ileum inflammation (backwash ileitis) demonstrable by barium enema or small bowel examination. Ulcerative colitis is an exudative, inflammatory disease involving primarily the mucosa and submucosa; involvement of the muscularis threatens colonic perforation or toxic dilatation. The mucosa becomes hyperemic, edematous, and infiltrated with inflammatory cells. Coalescing abscesses may cause the mucosa to slough and ulcerate, or ulceration may be irregular, leaving pseudopolyps in intact mucosa. Submucosal fibrosis narrows and shortens the colon under regenerated mucosa. Mucous and bloody stool, abdominal cramps, and fever are common signs of ulcerative colitis; the abnormal sigmoidoscopic findings include mucosal dullness, hyperemia, ar granularity, friability, thickness and nodulation of the mucosa. The course of the disease is variable. Primary findings in the acute stage include edema, ulceration, and alterations in bowel motility; in the subacute stage, X-rays reveal ulceration, early fibrosis and mucosal regeneration. Chronic findings include fibrosis, epithelium regeneration, and pseudopolyposis with bov shortening and rigidity, flexure depression, and lumen narrowir Toxic dilatation may occur in the acute or chronic stages of th disease. The colon becomes greatly dilated, causing a distende tender abdomen suggestive of imminent bowel perforation. Ca cinoma of the colon developed in 6% of the author's ulcerative colitis patients; of these, 4% had chronic and burnt out colitis and the other 2% had the active form. Colonic carcinoma and ulcerative colitis are easily distinguishable by the X-ray pictur Ileal involvement is evident in 5%-30% of all colitis patients. Mucosa is minimally affected and the length of involvement varies from 4-20 cm. Ileal findings are limited in degree and extent despite marked colonic involvement. Although the pseudopolyposis of ulcerative colitis is difficult to differentiat from familial polyposis, roentgenology has proven the primar diagnostic tool in ulcerative colitis.

533 **NEWER APPROACHES TO ULCERATIVE COLITIS.** *(E.)* Kraft, S. C. (U. Chicago Sch. Med., Ill.). *Ann. Intern. Med.* 67(6):1344-1346, 1967.

534 **SPECIAL FEATURES OF CANCER OF THE COLON FOLLOWING ULCERATIVE COLITIS.** *(E.)* Valdes-Dapena, A. M. Pp. 59-65 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson (Eds.) New York, Hoel Med. Div. Harper and Row, 1967. 319 pp.

535 **CEREBRAL VENOUS THROMBOSIS AS A COMPLICATION OF ULCERATIVE COLITIS.** *(E.)* Harrison, M. J. G. (Radcliffe Infirm., Oxford, England) and S. C. Truelove. *Amer. J. Dig. Dis.* 12(10):1025-1028, 1967.

536 **ULCERATIVE COLITIS: A CLINICAL STUD ON 95 PATIENTS.** *(Por.)* Bettarello, A. (U. Sao Paulo, Brazil), J. V. Martins Campos, L. P. de Araujo an J. Fernandes Pontes. *Arq. Gastroenterol.* 4(2):93-190, 196

537 **CELL-MEDIATED IMMUNE REACTION TO AUTOLOGOUS COLON.** *(E.)* Fink, S. (Hines Ill.) and R. M. Mais. *J. Lab. Clin. Med.* 70(5):868-869, 196

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38 SELECTIVE MESENTERIC ARTERIOGRAPHY IN THE DIAGNOSIS OF PANCREATIC LESIONS.

E.) Nusbaum, M. (U. Pennsylvania, Philadelphia), S. Baum, K. osoda and W. S. Blakemore. *Amer. J. Gastroent.* 48(5):421-30, 1967

ancreatic lesions are visualized arteriographically by injecting e contrast agent (76% diatrozoate) through an Odman catheter ith the tip placed in the celiac axis or the superior mesenteric tery. Catheter manipulation was controlled by image-intensi- ed television monitor. Application of the technique to 500 atients yielded 38 with pancreatic pathology (insulinoma, 4; ysts, 3; abscesses, 2; chronic pancreatitis, 6; carcinoma of the ead of the pancreas, 12; and carcinoma of the body and tail f the pancreas, 11). The latter group was diagnosed preoper- ively by superior mesenteric arteriography; 8 of the 11 pre- ented an upper abdominal pulsatile mass associated with a ruit audible by stethoscope. Surgery confirmed the findings: naller pancreatic branches were truncated and displaced and e splenic vein was either narrowed or obstructed in 8 of the 1 cases. Encircling and narrowing of the branches of the celiac xis by a large malignant neoplasm was responsible for the pul- atile nature of the mass and the bruit heard. Carcinoma of ead of the pancreas, when sufficiently large, has been arterio- raphically diagnosed by displacement of the gastroduodenal nd pancreaticoduodenal arteries. Truncation and disruption of e pancreatic arcades and obstruction of the superior mesen- eric vein as it enters the head of the pancreas are consistent rteriographic findings. Though useful for the preoperative diag- osis of pancreatic lesions, arteriography has not permitted early iagnosis of pancreatic carcinoma, which is not detectable until umor growth has displaced major blood vessels. Refinement f selective arteriography and the use of magnification serial ar- eriography with visualization of fine vasculature promise earlier iagnosis of pancreatic carcinoma.

39 PANCREATIC SCINTIGRAPHY.

(Pol.) Toth, Z. (Radiol. Radiobiol. Prev. Ctr., Warsaw, Poland) nd J. Przedlacki. *Pol. Arch. Med. Wewn.* 39(6):841-844, 1967.

The value of ^{75}Se-labeled selenomethionine in the scintigraphic iagnosis of inflammation and tumors of the pancreas is illustrated y three scintigrams taken after the administration of 3.5 μC/kg. The radiation dose after ingestion of this amount is calculated to e 2.3 rad to the whole body, 0.62 rad to the pancreas, 0.2 rad o the liver, and 14.5 rad to the kidneys. The distribution and ate of labeled selenomethionine and the decay of Se^{75} in the iver and pancreas of dogs are discussed based on data from the iterature.

540 PANCREATIC FUNCTION IN SJÖGREN'S SYNDROME.

(E.) Hradsky, M. (Charles U., Prague, Czechoslovakia), V. Bartoš and O. Keller. *Gastroenterologia* 108(5):252-260, 1967.

The results of pancreozymin-secretin tests were obtained from 20 fasted patients with Sjögren's syndrome (ages 37-75 yr). All patients had xerostomia, keratoconjunctivitis sicca, and elevated erythrocyte sedimentation rates. None showed clinical evidence of pancreatic insufficiency. Duodenal secretions were collected, by aspiration, 20 min before and after i.v. pancreozymin administration. Intravenously injected secretin was given and 3 samples were similarly collected. Each aspirate was analyzed for volume, bicarbonate, amylase, and lipase concentrations. Gastric secretions were collected at 15 min intervals for 2 hr following s.c. histamine injections. Patients with Sjögren's syndrome had decreased pancreatic function. Duodenal content and bicarbonate concentration were decreased after secretin injection. Only 6 patients had abnormal volume responses to pancreozymin. Serum amylase was abnormal in 3 patients: it was increased in 2 and decreased in 1.

541 ENDOCRINE SYNDROMES ASSOCIATED WITH PANCREATIC ISLET CELL TUMORS. *(E.)*

Levin, M. E. (Washington U. Sch. Med., St. Louis, Mo.). *Med. Clin. N. Amer.* 52(2):295-312, 1968.

This extensive review presents evidence that cells of the islets of Langerhans possess seemingly unlimited hormonal capabilities. Over 800 cases of tumors of the islets of the pancreas have been reported; the chief clinical manifestation has been hypoglycemic episodes. In a few reported cases, a functioning alpha cell tumor has produced glucagon. Available data suggest (but do not confirm) that the gastrin-producing ulcerogenic islet cell tumor of the Zollinger-Ellison syndrome arises from the D cell. Other conditions produced by islet cell tumors include Cushing's syndrome, the Zollinger-Ellison syndrome, and the carcinoid syndromes; occasionally these syndromes (alone or in combination) have been associated with hypoglycemia. Since islet cell tumors are frequently associated with adenomas originating in other endocrine glands, hypersecretion of several hormones from different glands may be present. Further definition of the role of islet cell tumors requires that surgical specimens be properly prepared for histochemical and biochemical study, which to date has been insufficiently performed. The urine and plasma of patients bearing these tumors should also be assayed for various hormones.

542 CHYLOUS ASCITES FOLLOWING PANCREATODUODENECTOMY.

(E.) Walker, W. M. (Northwestern U. Med. Sch., Chicago, Ill.). *Arch. Surg.* 95(4): 640-642, 1967.

543 BROWN BOWEL AND SKELETAL MYOPATHY ASSOCIATED WITH VITAMIN E DEPLETION IN PANCREATIC INSUFFICIENCY (CASE REPORT).

(E.) Bauman, M. B. (U. Pennsylvania, Philadelphia), J. D. DiMase, F. Oski and J. R. Senior. *Gastroenterology* 54(1):93-100, 1968.

544 SUITABLE TEST METHODS FOR DISEASES OF THE EXOCRINE PANCREAS. *(Ger.)*

Herfort, K. (Med. Polyclin. Charles U., Prague, Czechoslovakia) and J. Rosch. *Munchen. Med. Wschr.* 110(5):249-259, 1968.

545 ENZYME DIAGNOSIS AND CLINICAL SIGNIFICANCE OF DISEASES OF THE PANCREAS.

(Ger.) Osten, W. (Rudolf Virchow Hosp., Berlin, Germany). *Deutsch. Med. J.* 19(1):16-22, 1968.

546 A STUDY OF A PATIENT WITH AN EXTERNAL PANCREATIC FISTULA.

(E.) Schapiro, H. (U. Tennessee Coll. Med., Memphis), J. B. Ragland, R. Sherman and L. D. Wruble. *Amer. J. Digest. Dis.* 12(10):1029-1035, 1967.

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547 BIOCHEMICAL STUDIES OF SWEAT SECRETION IN CYSTIC FIBROSIS. *(E.)* Schwarz, V. (Manchester, England). *J. Lab. Clin. Med.* 70(5):859, 1967.

548 EFFECT OF PANCREATIC REPLACEMENT THERAPY ON METABOLIC BALANCE IN ADOLESCENT FIBROCYSTIC DISEASE. *(E.)* French, A. B. (Ann Arbor, Mich.) and H. B. Cook. *J. Lab. Clin. Med.* 70(6): 1005, 1967.

549 SERIOUS DIGESTIVE HEMORRHAGES DUE TO THE RUPTURE OF AN ANEURYSM OF THE SPLENIC ARTERY IN THE PANCREATIC DUCTS. *(Fr.)* Editorial. *Sem. Hop. Paris* (4):249-250, 1968.

550 THE RESULTS OF CEPHALIC DUODENOPANCREATECTOMY FOR PANCREATIC LITHIASIS. *(Fr.)* Guillemin, G. (Lyon, France), A. Vachon, M. Girard, G. Braillon, J. Cuilleret and R. Tete. *Arch. Mal. Appar. Dig.* 56(10):949-960, 1967.

551 SURGICAL TREATMENT OF CARCINOMA OF THE PANCREAS. *(E.)* Rhoads, J. M. Pp. 144-149 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* W. S. Blakemore, and L. K. Ferguson. (Eds.). New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

552 DISCUSSION ON PANCREAS. *(E.)* Rhoads, J. M. (Chairman). Pp. 150-159 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* W. S. Blakemore, and L. K. Ferguson. (Eds.). New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

553 CYSTIC FIBROSIS: A BIBLIOGRAPHY. *(E.)* The National Cystic Fibrosis Research Foundation, 1967. [A limited number of copies are available from the Scientific Communications Office, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Bethesda, Md. 20014].

554 PANCREATIC DUCTS AND THE IMPORTANCE OF ITS ARCHITECTONICS. *(Cz.)* Moravec, R., V. Chorvath, G. Cierny, J. Minar, J. Somodi and S. Kapustik. Pp. 14-25 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

555 RECENT KNOWLEDGE OF ENDOCRINE AND GENETIC ASPECTS OF PANCREATIC DISEASES. *(Cz.)* Kandrac, M. S. and J. Hrnciar. Pp. 5-13 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

556 INCRETORY ACTIVE PANCREATIC TUMORS. *(Cz.)* Rapant, V. and K. Turek. Pp. 49-67 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

557 PANCREATIC FUNCTION FOLLOWING GASTRIC OPERATIONS. *(Cz.)* Steiner, P., J. Sedlak, J. Palencar and P. Matis. Pp. 97-101 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

558 PANCREAS SURGERY IN CHILDHOOD. *(Cz.)* Kratochvil, M., M. Janec, V. Pohl and G. Terstianska. Pp. 76-84 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

559 INTERVENTIONS ON THE NERVOUS SYSTEM IN PANCREATIC DISEASES. *(Cz.)* Kukura, A. Pp. 71-75 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

560 CONTRIBUTION TO THE TREATMENT OF THE HEAD OF PANCREAS NEOPLASMS. *(Cz.)* Micek, F., J. M. Bencur and A. Dvorsky. Pp. 139-145 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

561 CONTRIBUTION TO THE PROBLEM OF PANCREATIC CYSTS AND PSEUDOCYSTS. *(Cz.)* Polak, E. Pp. 131-138 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

562 SURGICAL INTERVENTIONS OF THE PANCREAS. *(Cz.)* Niederle, B. Pp. 118-130 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

563 A NEW APPROACH TO THE TECHNIQUE OF THE RECONSTRUCTION STAGE FOLLOWING CHOLEDOCHODUODENOPANCREATECTOMY. *(Cz.)* Omanik, Pp. 146-151 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

564 A CASE OF PANCREATIC CYSTADENOMA. *(It.)* Torre, C. (San Giacomo Hosp., Rome, Italy). *Chir. Gastroent.* 1(3):398-408, 1967.

565 SIGNIFICANCE OF SPLENOPORTOGRAPHY FOR THE DIAGNOSIS OF PANCREATIC DISEASES. *(Ger.)* Moldenhauer, W. (Rostok, E. Germany). *Cesk. Radiol.* 19(4/5):328-332, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

566 PANCREATIC DUCTS IN INFLAMMATORY AND NEOPLASTIC PROCESSES OF THE PANCREAS. *(Ger.)* Anacker, H. (Giessen, E. Germany). *Cesk. Radiol.* 19(4/5):342-347, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

567 SPLENOPORTOGRAPHY IN THE DIAGNOSTIC OF PANCREATIC DISEASES. *(Cz.)* Cacciari, C. (Bologna, Italy), E. Pisi and G. Cavalli. *Cesk. Radiol.* 19(2): 91-94, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

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568 **PREOPERATIVE PANCREATOGRAPHY.** *(Cz.)* Vinogradov, V. V. (Moscow, USSR). *Cesk. Radiol.* 19(2):98-100, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

569 **PAINLESS PANCREATIC PSEUDOCYST RUPTURED INTO THE THORACIC CAVITY (CASE REPORT).** *(E.)* Merikas, G. (Evang. Med. Ctr., Athens, Greece), G. Stathopoulos and A. Katsas. *Gastroenterology* 54(1):101-104, 1968.

570 **CARCINOID SYNDROME ASSOCIATED WITH PANCREATIC TUMORS.** *(E.)* Dollinger, M. R. (Sloan-Kettering Inst. Cancer Res., New York City), L. H. Ratner, C. A. Shamoian and B. D. Blackbourne. *Arch. Intern. Med. (Chicago)* 120(5):575-580, 1967.

571 **PANCREAS TRANSPLANTATION IN THE DOG. A STUDY ON THE SURVIVAL AND FUNCTIONAL POTENTIALITIES OF THE TRANSPLANT.** *(Fr.)* Grenier, J. F. (Dig. Path. Surg. Res. Group I.N.S.E.R.M., Strasbourg, France), M. Gillet, G. Santizo Lepe, A. Klein, A. M. Barth and A. G. Weiss. *Ann. Chir.* 21(25/26):1523-1537, 1967.

572 **PANCREATIC TISSUE IN ANTRAL WALL.** *(E.)* French, W. E. (U. Tennessee Coll. Med., Memphis). *Amer. J. Surg.* 114(6):956-957, 1967.

573 **PANCREATODUODENECTOMY FOR TRAUMA.** *(E.)* Salyer, K. (U. Texas Southwest Med. Sch., Dallas) and R. N. McClelland. *Arch. Surg.* 95(4):636-639, 1967.

See also abstract nos.: 52,119,193,385

574 PAINLESS CHRONIC PANCREATITIS. *(E.)* Herfort, K. (Charles U., Prague, Czech.), M. Kecklik and Z. Sivanova. *Gastroenterologia* 108(4):169-176, 1967.

Clinical and laboratory data are given for 1 female and 3 male patients aged 40-60 with painless chronic pancreatitis (PCP), and findings are compared with those of 43 other PCP patients and 689 chronic relapsing pancreatitis (CRP) patients from literature. All 4 of the authors' patients displayed steatorrhea and weight loss. Subsequent laparotomy on 2 revealed enlarged pancreas; 3 were diabetic and 3 had pancreatolithiasis. Etiological factors and clinical symptoms of patients with PCP and CRP were compared. CRP was more often due to lithiasis of the biliary system and alcohol abuse, less often to hereditary, endocrine, and metabolic factors. PCP was caused by similar etiological factors but the frequencies differed. Etiology was idiopathic in two-thirds of all PCP cases and one-fourth of the CRP cases. PCP was caused by biliogenic factors in 3.3%. The incidence of CRP and especially PCP was higher in males. Biliogenic factors were more frequent in females with CRP.
The major symptoms of advanced pancreatic insufficiency (steatorrhea, pancreatic calcification, and diabetes) were more frequently observed in PCP, possibly because the pain of CRP leads to earlier diagnosis and treatment. Steatorrhea was apparent in 18% of the CRP patients and 91% of the PCP patients; pancreatic calcification in 20% of the CRP and 68% of the PCP patients, and diabetes in 22% of the CRP and 49% of the PCP patients. All symptoms were present in over one-third of the PCP patients. Advanced pancreatic insufficiency may follow both PCP and CRP. The absence of pain in PCP may simply be due to individual differences in pain perception, or PCP may be a special form of chronic pancreatitis clinically and etiologically distinct from CRP.

575 GLUCOCORTICOID-INDUCED PANCREATITIS IN CHILDREN. *(E.)* Riemenschneider, T. A. (UCLA Med. Ctr., Los Angeles, Calif.), J. F. Wilson and R. L. Vernier. *Pediatrics* 41(2):428-437, 1968.

Six new cases of glucocorticoid-induced pancreatitis in children are presented; 4 represent the first association with systemic lupus erythematosus. Prednisone was employed in all cases in daily doses of 80-300 mg over periods of 6 days (2 cases) to 9 months. Clinical symptomatology varied widely. The first 3 patients were severely ill with acute abdominal symptoms and had clinical courses complicated by vascular collapse and renal failure. In 2 patients dying during the acute episode autopsy revealed extensive hemorrhagic pancreatic destruction. Cases 4 and 5 experienced severe abdominal pain but followed less complicated courses. Case 6 exhibited no symptoms consistent with acute pancreatitis and died of complications of the primary disease (leukemia, renal failure); on autopsy the pancreas showed scattered focal areas of acinar necrosis with surrounding acute interstitial inflammation. Acute pancreatitis should be considered in any patient receiving glucocorticoids who develops abdominal pain and distention, or presents with shock or coma in the absence of abdominal pain. When diagnosed during life, patients with a nonlethal underlying disease show a 50% survival rate. In treatment, emphasis is placed on prompt and judicious use of parenteral fluids to maintain normal plasma volumes. A brief review of the world literature is also presented.

576 ELEVATED SERUM TRYPSIN BINDING ACTIVITY IN PATIENTS WITH HEREDITARY PANCREATITIS. *(E.)* Adham, N. F. (U. Southern California, Los Angeles), B. Dyce and B. J. Haverback. *Amer. J. Dig. Dis.* 13(1):8-15, 1968.

A family is described which has a high incidence of hereditary pancreatitis. Five members (3 males, 2 females; ages 14-49 yr) are known to have the disease and 2 others are suspected. Two of the subjects showed a two-fold increase in serum trypsin binding activity despite the fact that serum α_2-macroglobulin levels were within the normal range. The biological significance of this finding is not yet known. Diabetes developed in 3 cases. Surgery, involving partial excision of the pancreas, sphincterotomy, and pancreaticojejunostomy, was performed in 2 cases, with no lasting relief in 1 case, and temporary relief in the other. Recurrent attacks of abdominal pain began in early childhood in all affected members. Pancreatic calcifications are present in 3 members and steatorrhea in 2. Aminoaciduria was not found in 2 patients. None of the affected members had evidence of hyperlipemia, cholelithiasis, or hyperparathyroidism; none are sporadic or chronic alcoholics. Although the disease is reported to be transmitted as an autosomal dominant trait, incomplete penetrance or recessiveness are very likely mechanisms.

577 ACUTE PANCREATITIS AS A PSYCHOPHYSIOLOGIC RESPONSE: A CASE STUDY. *(E.)* Tripp, L. W. (U. Texas Southwestern Med. Sch., Dallas) and D. P. Agle. *Amer. J. Psychiat.* 124(9):1253-1257, 1968.

The case is presented of a 30-yr-old married, professional man, a former exhibitionist, who volunteered for outpatient psychotherapy. Over a 5-yr period the patient experienced 11 documented and additional undocumented episodes of acute pancreatitis. Feeling sexually rejected by his wife, the patient decided to terminate sexual relations with her; one week later he experienced acute abdominal pain requiring hospitalization. Laparotomy revealed acute pancreatitis rather than the suspected peptic ulcer. The psychological circumstances surrounding 7 of the 11 episodes of pancreatitis were documented. The affects (guilt, anger, and a sense of rejection) accompanying these 7 episodes were strikingly similar, always involving emotionally charged scenes, usually with his wife or disapproving father. Psychotherapy over a 16-month period helped the patient with many of his problems; this progress was accompanied by a significant decrease in severity and duration of the episodes of pancreatitis.

578 PROPOSED REGIMEN FOR THERAPY OF REFRACTORY SHOCK IN ACUTE PANCREATITIS. *(E.)* Spier, N. (North Shore Hosp., Manhasset, N. Y.). *New York J. Med.* 68(4):527-531, 1968.

Hypovolemia, in the early stages, and sepsis, in the later stages of acute pancreatitis, are the most important causes of refractory shock. A proposed regimen of general and specific measures to be taken in treating acute pancreatitis shock are presented. Surgical and pharmaceutical adjuncts of possible value against shock may play a secondary role in therapy or nay be in the nature of "last ditch" efforts. Refractory shock accompanying acute pancreatitis portends a severe prognosis which can be enhanced if the proposed regimen, based on present experimental knowledge, is followed. Administration of i.v. fluids, anticholinergics, and antibiotics and careful monitoring of hematocrits, serum electrolytes, and serum calcium levels are some general measures to be taken. Specific measures include a series of plasma and blood transfusions to overcome the hypovolemia and the administration of isoproterenol if transfusions are insufficient to relieve shock; hydrocortisone administration is proposed if isoproterenol fails to bring about relief. Monitoring of central venous pressure is an essential part of the regimen.

579 EXPERIMENTAL STUDY ON ALCOHOLIC PANCREATITIS. *(E.)* Maki, T. (Tohoku U. Sch. Med., Sendai, Japan), G. Kakizaki, T. Sato, Y. Saito, T. Onuma and N. Noto. *Tohoku J. Exp. Med.* 92(4):415-420, 1967.

The effect of chronic administration of alcohol on the pancreas was determined in 6 groups of Wistar rats maintained on different dietary regimens. Groups contained 12-22 rats; 5 from each group were killed at once to determine control amylase levels and the normal structure of the pancreas. The remaining 75 rats were given 15% alcohol in place of water for 2 months. The group maintained on a high carbohydrate diet showed the least changes in serum amylase and in histological changes in the pancreas. Besides a group on a standard diet, the other 4 groups were as follows: 1) high protein; 2) high fat; 3) high protein and fat; and 4) low protein and high fat.

580 SHISTOSOMOTIC PANCREATITIS IN CHILDHOOD. (CASE REPORT DIAGNOSED IN LIFE. *(Por.)* Queiroz, A. S. (Paulist Sch. Med., Brazil), B. J. Schmidt, P. J. Barbante, P. A. Jorge, J. Pinus, J. C. Neves, A. Carvalho and S. Carvalhal. *Arq. Gastroent.* 4(4):295-300, 1967.

581 SURGICAL TREATMENT OF CHRONIC AND RELAPSING PANCREATITIS. *(E.)* Howard, J. M. Pp. 137-143 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson (Eds.). New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

582 DIAGNOSIS AND TREATMENT OF ACUTE PANCREATITIS. *(E.)* Johnson, T. A. Pp. 134-136 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson (Eds.). New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

583 ENZYMATIC FACTORS IN PANCREATITIS. *(E.)* Eisenhardt, R. H. Pp. 125-133 in *Current Perspectives in Gastroenterology. (Current Perspectives in Surgery).* Blakemore, W. S. and L. K. Ferguson (Eds.). New York, Hoeber Med. Div. Harper and Row, 1967. 319 pp.

584 DISTURBANCES OF GLYCIDE METABOLISM IN PANCREATITIS. *(Cz.)* Razus, M. and J. Paulik. Pp. 68-70 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

585 PANCREATITIS. *(Cz.)* Carsky, K., B. Ohradka and S. Zilavy. Pp. 85-96 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

586 POSTOPERATIVE PANCREATITIS. *(Cz.)* Chorvath, V., R. Moravec, J. Balada and J. Simek. Pp. 102-117 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

587 DIAGNOSIS OF CHRONIC RELAPSING PANCREATITIS. *(Cz.)* Bartos, V. *Sbor. Ved. Prac. Lek. Fak. Karl. Univ.* 8(1):27-52, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

588 DIAGNOSIS AND TREATMENT OF ACUTE HEMORRHAGIC PANCREATITIS. GENERAL MEDICAL AND SURGICAL ASPECTS. *(Ger.)* Schopp, R. (Maria Theresa Clin., Munich, Germany). *Munchen Med. Wschr.* 110(5):260-265, 1968.

589 HYPOCALCEMIA AND TETANY WITH STEROID-INDUCED ACUTE PANCREATITIS. *(E.)* Cortese, A. F. (New York Hosp. Cornell Med. Ctr., New York City) and F. Glenn. *Arch. Surg.* 96(1):119-122, 1968.

590 DL-ETHIONINE IN PREVENTION OF EXPERIMENTAL PANCREATITIS IN THE RAT. *(E.)* Alvizouri, M. (Munic. Hosp., Morelia, Mexico) and L. Borunda. *Amer. J. Dig. Dis.* 12(10):1017-1024, 1967.

591 PANCREATITIS. *(E.)* White, T. T. Williams & Wilkins, Baltimore, 1966. 214 pp.

592 BIOCHEMICAL INVESTIGATION METHODS APPLIED IN THE DIAGNOSIS AND FOLLOW-UP OF ACUTE PANCREATITIS. *(Cz.)* Brix, M., E. Brisova, S. Zilavy, M. Marazova, K. Koren and M. Cano. Pp. 26-31 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

593 EXPERIMENTAL PANCREATITIS. *(Cz.)* Zilavy, S., M. Brix, M. Meskova, E. Chylo and D. Chorvath. Pp. 32-39 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

594 PRESENT STATE OF ANTIENZYMATIC PREVENTION AND THERAPY OF ACUTE PANCREATITIS. *(Cz.)* Malek, P. Pp. 40-48 in *Surgical Diseases of the Pancreas.* Obzor, 1965. 150 pp. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

LIVER AND BILIARY TRACT
GENERAL

595 **EFFECT OF 3-HYDROXY-3-METHYLGLUTARIC ACID ON HYPERCHOLESTEROLEMIC LIVER.** *(E.)* Beg, Z. H. (Dept. Chem., Aligarh Muslim U., India), M. Siddiqi and R. A. H. Siddiqi. *Experientia* 24(1):15-16, 1968.

The effects of 3-hydroxy-3-methylglutaric acid (HMG) on hepatic cholesterol were studied in groups of young albino rats which were first fed a high cholesterol diet for 2 weeks. HMG was then administered to one group, which with its controls was continued on the experimental diet, and to another group, which with its controls was then transferred to the basal diet. In both experiments, 1-5 days of HMG treatment significantly reduced total liver cholesterol compared to the control groups. Histological examination of hypercholesteremic rat livers showed intracellular fatty deposits. After 4 days of HMG treatment, liver cells of hypercholesteremic rats did not show lipid deposition, although there was an increase in reticuloendothelial cells as compared to the normal rat liver. It is suggested that HMG is not only capable of lowering serum and liver cholesterol levels but possesses the ability to reverse changes in liver parenchyma due to hypercholesteremia more quickly than the body's homeostatic mechanisms.

596 **PLASMA AND URINARY BILIRUBIN AFTER ADMINISTRATION OF SODIUM DEHYDROCHOLATE TO JAUNDICED PATIENTS.** *(E.)* Hoenig, V. (Charles U., Prague, Czech.) and J. Hoenigova. *Gastroenterologia* 108(4):226-231, 1967.

The effects of sodium dehydrocholate (Decholin) on levels of directly- and indirectly-reacting bilirubin, filterable plasma bilirubin, and urinary bilirubin were studied in 10 viral hepatitis patients with jaundice or obstructive jaundice, 11 congenital spherocytosis patients, 10 portal cirrhosis patients with or without mild jaundice, and 10 control subjects without clinical liver damage. All experimental subjects received 10 ml of Decholin; in control experiments, 10 ml of 5% dextrose and 10 ml of 0.9% saline were given to 10 patients with hepatic and post-hepatic jaundice. Decholin increased directly-reacting and decreased indirectly-reacting bilirubin in patients with hepatic and post-hepatic jaundice. It increased filterable plasma bilirubin and urinary bilirubin. There was a rise in directly-reacting bilirubin in cirrhotic patients and a rise in indirectly-reacting bilirubin in hemolytic jaundice patients. Slight increases in directly-reacting bilirubin occurred in the control subjects. Both bilirubin fractions decreased after glucose administration; only directly-reacting bilirubin decreased after saline injection. Urinary bilirubin decrease was slight. Results indicate that Decholin may accentuate jaundice by displacing bilirubin on the plasma albumin molecule, making a greater amount of unconjugated bilirubin available and thus increasing the total plasma bilirubin, filterable plasma bilirubin, and urinary bilirubin.

597 **EFFECTS OF UREASE INHIBITION IN HYPERAMMONEMIA: CLINICAL AND EXPERIMENTAL STUDIES WITH ACETOHYDROXAMIC ACID.** *(E.)* Summerskill, W. H. J. (Mayo Clinic, Rochester, Minn.), F. Thorsell, J. H. Feinberg and J. S. Aldrete. *Gastroenterology* 54(1):20-26, 1968.

Eck fistulas were created by end-to-side portacaval anastomoses in 2 male and 4 female dogs. After recovery from surgical preparation, the animals were tested 6 times over 3 months to determine the effect of acetohydroxamic acid (AHA), an urease inhibitor, on hyperammonemia. The dogs were tested fasting overnight. Blood ammonia levels were determined at 30-min intervals before and after intragastric administration of AHA (60 mg/kg); i.v. urea (1 g/kg); AHA and urea; AHA (120 mg/kg) plus urea; and urea following 48-hr neomycin treatment (0.1 mg/kg/24 hr). In the dogs, AHA reduced fasting blood ammonia levels and prevented hyperammonemia from occurring after urea administration. AHA shows no observable toxic effects and is quickly absorbed in the gastrointestinal tract and excreted in the urine. In clinical studies, 5 comatose patients with unresponsive hepatic failure were selected. Blood ammonia concentrations were determined 3 hrs before, during, and after AHA treatment (20-60 mg/kg). No consistent clinical effects were observed after AHA treatment, but a significant reduction in blood ammonia levels occurred. All the patients eventually died, but there was no evidence of AHA toxicity. These preliminary data warrant further investigation of AHA as an adjunct to treatment in some instances of hepatic coma.

598 **AN EXPERIMENTAL STUDY OF A FLUORESCENT ORGANIC COMPOUND WHICH IS SELECTIVELY EXCRETED IN THE BILE.** *(Fr.)* Mercat, C. (Sch. Med. Pharm., Tours, France) and J. Bertrand. *Arch. Mal. Appar. Dig.* 56(11):1069-1084, 1967.

Extensive studies were conducted in mice, rats, rabbits and dogs using a water-soluble, non-dialyzable fluorescent dye (termed FB 57) which has the chemical structure of a sodium N-(p-stilbene)naphtho[3,4] triazoledisulfonate. The toxicity of this dye is very low (LD_{50} of 335 mg/kg i.v. in mice). In normal animals, a single i.v. injection of 5 mg/kg produces fluorescence in the hepatic sinusoids in 10 sec and passes thence into the hepatic cells to permit examination of the biliary system in about 3 min. The plasma concentration decreases exponentially to a retention of about 1% in 45 min, yielding a relative clearance coefficient of 22. In 2 hr, 80-95% of the injected dose is excreted into the bile, while only about 2% appears in the urine. There is practically no fixation to the tissues or plasma proteins, and no metabolism of the dye by the liver. In additional experiments on animals subjected to ligation of the bile duct, hepatic exclusion by a portacaval shunt, CCl_4 poisoning, or X-irradiation of the liver, the properties of FB57 were found to be similar to those of sulfobromophthalein. Compared to sulfobromophthalein and indocyanin green, however, FB57 is characterized by less tissue fixation to plasma proteins, a more exclusively biliary excretion, and greater ease of determination. This makes it a valuable tool in the study of liver function.

599 **THE PROGNOSTIC SIGNIFICANCE OF THE DETERMINATION OF COAGULATION FACTOR V AND IX AND SERUM CHOLINESTERASE ACTIVITY IN LIVER DISEASE.** *(Fr.)* Stefanovic, S., M. Ristic, R. Baklaja, L. Glidzic and R. Veljovic. (Sch. Med., Belgrade, Yugoslavia). *Arch. Mal. Appar. Dig.* 56(11):1095-1101, 1967.

Serial determinations of serum cholinesterase activity and of the plasma levels of factors V and IX were made in 31 patients, including one who died of subacute necrosis of the liver, 3 with compensated cirrhosis of the liver, and 27 with decompensated cirrhosis, 7 of whom also died during hospitalization. Although the serum cholinesterase activity was consistently depressed and is thus better than serum transaminases for diagnosing early hepatic insufficiency, it is too sensitive to provide a basis for estimating the severity and prognosis of the condition. In contrast, the plasma values of factors V and IX decrease gradually as the hepatic insufficiency progresses, and are suitable as a basis for prognosis. In this connection, a drop in the factor IX level below 40% probably portends a fatal outcome.

600 LUPOID HEPATITIS OF LATE ONSET. *(E.)*

Murdock, J. C. (Western Infirmary, Glasgow, Scotland) and R. N. M. MacSween. *Scot. Med. J.* 13(1):17-23, 1968.

Late onset lupoid hepatitis is described in 3 women over 50 yr of age. All had evidence of continuing active hepatitis associated with relapsing jaundice, and elevated serum transaminases. All had hypergammaglobulinemia, cirrhosis, "piece meal" liver cell necrosis and a heavy chronic inflammatory cell infiltrate of lymphocytes and plasma cells. All had positive anti-nuclear factor; two had positive L.E. tests with minor lupus erythematosus systemic manifestations; one had smooth muscle antibody The clinical and serological findings in these cases fit Mackay's classification of lupoid hepatitis, and would suggest that the disease has an autoimmune etiology.

601 REGIONAL AMMONIA LEVELS IN PATIENTS WITH PORTAL HYPERTENSION. REPORT 3.

(It.) Marinaccio, G. (Inst. Spec. Surg. Path., U. Bari, Italy), V. Ronzini, S. Ferrarese and V. Disanto. *Riv. Gastroent.* 19(2): 91-93, 1967.

Determinations of the blood ammonia levels in 20 patients (11 men, 9 women; 18-75 yr old) subjected to surgery for portal hypertension with ascites and esophageal varices revealed significant average increases compared to patients without liver disease (to 0.93 and 0.99 μg/ml in the superior and inferior mesenteric veins, resp.). There was also a marked equalization of the ammonia levels in the various regions of the circulation, although low values were still obtained from the aorta, suprahepatic vein and peripheral circulation. These results are ascribed to changes in intestinal motility, to stasis in the portal circulation, and especially to the existence of spontaneous shunts (portacaval and from the intrahepatic portal circulation to the hepatic venous circulation). It is suggested that the respiratory apparatus, as well as the liver, plays a role in the detoxification of ammonia.

602 CHARACTERIZATION OF THE TYPES OF ENZYMATIC ACTIVITY IN HOMOGENATES OF *FASCIOLA HEPATICA* BY MEANS OF AGAR IMMUNOELECTROPHORESIS. *(Fr.)*

Tran Van Ky, P. (Sch. Med. Pharm., Lille, France), T. Vaucelle, A. Capron and A. Vernes. *Bull. Soc. Path. Exot.* 60(3):263-272, 1967.

A combination of agar immunoelectrophoresis, using rabbit hyper-immune serum, and the techniques of enzyme identification revealed 12 different types of enzymatic activity in fresh homogenates of *Fasciola hepatica* obtained from cattle and sheep livers. Enzyme-antibody complexes which could be identified included 4 types of DPN- or TPN-dehydrogenases (lactic, malic, alanine and glucose-6-phosphate dehydrogenase), several esterases, alkaline phosphatase, trypsin and chymotrypsin. It is suggested that this information may prove valuable for diagnostic and therapeutic purposes, in addition to contributing to an understanding of the biochemistry of the parasite.

603 INFECTIVE HEPATITIS AND TOXIC JAUNDICE IN A MUNICIPAL HOSPITAL DURING A FIVE-YEAR PERIOD: INCIDENCE AND PROGNOSIS. *(E.)*

Bjrneboe, M. (Bispebjerg Hosp., Copenhagen, Denmark), O. Iversen and S. Olsen. *Acta Med. Scand.* 182(4):491-501, 1967.

A review of the 640 cases of jaundice (serum bilirubin >1.5 mg%) encountered among 23,600 patients admitted to two departments of Bispebjerg Hospital in the period 1960-64 revealed that most were due to gallstones (305 cases), cirrhosis (141 cases) or cancer (128 cases). However, there were also 35 cases (17 men and 18 women) with viral hepatitis and 15 cases (9 men and 6 women) with drug-induced jaundice. The 35 patients with viral hepatitis included 11 who had had transfusions 2-5 months before; of these, 2 died of acute hepatitis, 2 were lost to follow-up, 2 developed cirrhosis and 5 recovered completely. Among the other 24 cases of viral hepatitis, one died following diagnostic surgery, 3 were lost to follow-up, 5 developed cirrhosis and 15 recovered completely. Among the 7 patients who developed cirrhosis, 6 were women and 3 died of cirrhosis during the follow-up period. The 15 cases of drug-induced jaundice included 6 of the hepatitis type and 9 of the cholestatic type; 4 of these patients were severely ill and in 2 the hepatic disease was a contributory cause of death. Chlorpromazine was implicated in 6 of the 15 cases. It is concluded that viral hepatitis and toxic jaundice are infrequent diseases, but may be serious in middle-aged and elderly patients, especially women.

604 HOMOCYSTINURIA: AMINO ACID PATTERN OF THE LIVER. *(E.)*

Tada, K. (Fac. Med., Tohoku U., Sendai, Japan), T. Yoshida, H. Hirono and T. Arakawa. *Tohoku J. Exp. Med.* 92(4):325-332, 1967.

A Hitachi KLA-3B automatic Amino Acid Analyzer was used to to determine free amino acids in a liver biopsy specimen from a 4-yr-old with homocystinuria and in liver specimens from 3 normal subjects. While homocystine was present to the extent of 16.6 mg/100 g of liver in the patient, it was not detectable in controls. The concentration of methionine was higher and that of cystine was lower in the homocystinuric liver than in the control liver. In the patient, homocystine was increased in the urine but not in the serum, while methionine was increased in the serum but not in the urine. It appears that there exists an active transport mechanism in the renal tubule for methionine but none for homocystine. No methionine or homocystine was detected in cerebrospinal fluid.

605 RISK OF ANICTERIC HEPATITIS FOLLOWING BLOOD TRANSFUSION. *(E.)*

Somayaji, B. N. (Dudley Road Hosp., Birmingham, England), W. D. Stone and P. B. Glover. *Gut* 8(6):614-617, 1967.

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Forty-two patients (aged 18-70 yr), who received 128 U (540 ml each) of blood, were studied for 22 weeks to observe the incidence of anicteric hepatitis following transfusion; 21 patients received 3 or more U. Serum aspartate aminotransferase and alanine aminotransferase, in addition to standard liver function tests, were done either immediately before or after transfusion. In repeated studies performed at up to 22 weeks after transfusion, only 2 patients showed transient elevated serum aspartate aminotransferase levels. None of the patients developed anicteric hepatitis. The differences between this study and others may be due to our more careful selection of donors and to the fact that they were volunteers. It was previously shown that recipients of blood from professional donors develop hepatitis more frequently than those receiving voluntary donations.

606 **ALCOHOLIC STEATOSIS.** *(Fr.)* Feldmann, G. (Paris Hosp., France). *Rev. Med.* 8(29):1493-1496, 1967.

Thirteen chronic ethylism patients presenting signs of hepatic steatosis were studied by electron microscopy. Ultrastructural study revealed multiple abnormalities, of which the most interesting were mitochondrial modifications apparently due to ethylic intoxication. Other observations included swollen mitochondria, isolated crest alterations, and round bodies which were sometimes as large as the giant mitochondria themselves.

607 **THORACIC DUCT CANNULATION IN DOGS WITH ASCITES AND PORTAL HYPERTENSION.** *(E.)* Cueto, I. (West Virginia U. Med. Ctr., Morgantown), N. Tajen and R. A. Currie. *Arch. Surg.* 96(1):9-13, 1968.

The circulatory effects of thoracic duct cannulation and lymph drainage were studied under pentobarbital anesthesia in normal dogs, in dogs with ascites created by hepatic vein occlusion (the Orloff operation), and in dogs with ascites due to congestive heart failure (tricuspid insufficiency). In normal dogs, thoracic duct drainage had no effect other than slight decreases in circulating blood volume and renal blood flow after 6 hr; in dogs with surgically created ascites, however (a condition which resembles the Budd-Chiari syndrome in man), the portal venous pressure and thoracic duct lymph pressure dropped significantly and persistently after cannulation, without evidence of hypovolemia, hemoconcentration, azotemia or alterations in renal blood flow. In these same dogs, paracentesis alone produced hypotension and hypovolemia, followed by shock and decreases in portal venous pressure, thoracic duct lymph pressure and lymph flow. Dogs with ascites due to heart failure tolerated thoracic duct lymph drainage poorly. The resultant changes in portal venous pressure were accompanied by a serious degree of hypotension and by a drop in renal blood flow. The effective decrease in portal venous pressure produced by thoracic duct cannulation in dogs with ascites due to hepatic vein occlusion indicates that this procedure may have a rational place in the preshunt management of human portal hypertension complicated by bleeding esophageal varices.

608 **DETERMINATION OF ADENOSINE PHOSPHATES IN THE BLOOD OF PATIENTS WITH HEPATIC PROBLEMS.** *(E.)* Carrillo, L. A. M. (Quito, Ecuador). *Amer. J. Proctology* 19(1):50-54, 1968.

Blood levels of adenosine monophosphate (AMP), adenosine diphosphate (ADP), and adenosine triphosphate (ATP) were determined in 30 normal subjects (ages 10-50) and 28 patients (ages 10-70) with various hepatic diseases (16 with acute viral hepatitis, 7 with cirrhosis, and 5 in liver coma). The Laudahn technique was used for AMP and ADP determination, and a modification of the Hotzl-Laudahn technique for ATP determination. Normal levels were found to be 1.8 mg% (AMP), 5 mg% (ADP), and 20.2 mg% (ATP), with no significant age or sex differences. In the 16 infectious hepatitis patients, the three phosphate blood levels were 50% of normal, the decrease being proportional to duration and severity of the disease. In the 7 hepatic cirrhosis patients, the phosphate blood levels were even lower, ATP being the lowest. The 5 patients in hepatic coma had the lowest adenosine phosphate blood levels, the ATP level barely reaching 10% of normal. Adenosine phosphate blood levels are thus an index of the severity or intensity of the disease process.

609 **EXTENSIVE INVASION OF THE LIVER BY A GASTRIC "CARCINOID."** *(Por.)* Faria, V. (Porto Sch. Med., Portugal) and M. C. de Oliveira. *J. Med. (Porto)* 65(1302):7-12, 1968.

610 **BUDD-CHIARI SYNDROME DUE TO HYDATID DISEASES OF THE LIVER, AND SUBSEQUENT HYDATID PERITONITIS.** *(Sp.)* Zanzi, I. (U. Chile, Santiago), J. Sapunar, V. Croizet and G. Bancalari. *Bol. Chile. Parasit.* 22(3):113-118, 1967.

611 **VALUE OF PERITONEOSCOPY AND SCINTILLOGRAPHY IN THE DIFFERENTIAL DIAGNOSIS OF HEPATOMEGALY- A CLINICAL CASE.** *(Sp.)* Munoz, M. A. (U. Chile, Santiago), R. Troncoso and J. Castro. *Bol. Chile. Parasit.* 22(3):123-125, 1967.

612 **A NEW GLYCOLIPID ACCUMULATION DISEASE (CERAMIDE TETRAHEXOSIDES).** *(It.)* Durand, P. (G. Gaslini Inst., Genoa, Italy), M. Philippart, C. Borrone, G. Della Cella, O. Bugiani. *Minerva Pediat.* 19(49):2187-2196, 1967.

613 **SYMPOSIUM ON CLINICAL ASPECTS ON PORPHYRIAS. 1). CLINICAL AND EPIDEMIOLOGICAL STUDIES OF HEPATIC PORPHYRIA IN JAPAN.** *(Jap.)* Sasaki, H. (Nigata U. Sch. Med., Japan). *J. Jap. Soc. Intern. Med.* 56(9):17-21, 1967.

614 **SYMPOSIUM ON CLINICAL ASPECTS ON PORPHYRIAS. 2). EPIDEMIOLOGIC AND CLINICAL STUDIES OF HEPATIC PORPHYRIA.** *(Jap.)* Takasaki, H. (Mie Prefect. U. Med. Sch., Japan). *J. Jap. Soc. Intern. Med.* 56(9):22-25, 1967.

SYMPOSIUM ON CLINICAL ASPECTS ON PORPHYRIAS. 3). PATHOGENESIS OF HEPATIC PORPHYRIA. *(Jap.)* Wada, O. (Tokyo U. Med. Fac., Japan). *J. Jap. Soc. Intern. Med.* 56(9):26-30, 1967.

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616 SYMPOSIUM ON CLINICAL ASPECTS ON PORPHYRIAS. 6). FROM THE CLINICAL VIEW: PORPHYRIA AND THYROTOXICOSIS. *(Jap.)* Nishikawa, M. (Osaka U. Med. Sch., Japan). *J. Jap. Soc. Intern. Med.* 56(9):42, 1967.

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LIVER AND BILIARY TRACT

678 **MAGNETIC SUSCEPTIBILITY AND HEPATIC IRON STORES: THE CORRELATION BETWEEN QUANTITATIVE DETERMINATIONS OF SUSCEPTIBILITY AND IRON IN HUMAN LIVER SPECIMENS. [ORAL COMMUNICATION; 40TH ANNUAL MEETING, CENTRAL SOC. CLIN. RES.]** *(E.)* Messer, M. J. (Cleveland, Ohio) and J. W. Harris. *J. Lab. Clin. Med.* 70(6):1008-1009, 1967.

679 **EFFECT OF CORTICOIDS ON URINARY BILE SUBSTANCE EXCRETION IN JAUNDICE PATIENTS.** *(It.)* Felkai, B. (1st Med. Clin. U. Szeged, Hungary) and I. Laszlo-Kahan. *Acta Med. Hung.* 24(3):195-205, 1967.

680 **PARTIAL HEPATECTOMY IN EXPERIMENTAL SCHISTOSOMIASIS; PRELIMINARY REPORT.** *(Sp.)* Ferraz, E. M. (Fac. Med. U. F. P., Brazil). *Arq. Gastroent.* 4(4):309-311, 1967.

681 **ACUTE PYELONEPHRITIS WITH BILIVERDIN JAUNDICE IN VERY YOUNG INFANTS.** *(Ger.)* Unger, G. (Martin-Luther U., Halle-Wittenberg, Germany). *Arch. Kinderheilk.* 176(3):309-317, 1968.

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Hepatic Injury

682 **CONVERTING ENZYME ACTIVITY IN LIVER DAMAGE.** *(E.)* Andersen, J. B. (U. Inst. Exp. Med., Copenhagen, Denmark). *Acta Path. Microbiol. Scand.* 71(1):1-7, 1967.

Plasma converting enzyme activity in 5 normotensive patients with normal hepatic function was compared with that of 5 cirrhotic patients with varying degrees of liver damage. The converting activity of the plasma 5 normal rats was also compared with that of 5 rats with ligated common bile ducts. The isolated rat uterus proved an accurate and sensitive organ for testing Angiotensin II (octapeptide) formed from Angiotensin I (decapeptide) in incubation systems using rat and human plasma. Neither humans nor rats showed any signs suggesting that impaired liver function decreases converting enzyme activity. In fact, a slight increase is seen in converting enzyme activity of cirrhotic patients, and rats with ligated common bile ducts.

683 **TOXIC HEPATOPATHY.** *(E.)* Zimmerman, H. J. (Vet. Admin. Hosp., Washington, D. C.). *Amer. J. Gastroent.* 49(1):39-56, 1968.

A review is presented of the different classes of hepatotoxic agents, their modes of action, and the influence of the host on the damage produced. One group of agents is intrinsically hepatotoxic while the other group depends on host idiosyncrasy for the production of liver damage. The latter group of agents does not show the dose dependence and experimental reproducibility of effects characteristic of the intrinsic group. The intrinsic group is further divided into direct hepatotoxins which are protoplasmic poisons (like CCl_4) and may damage other organs as well as liver, and indirect agents that produce damage by blocking metabolic or excretory pathways. The liver damage produced by some antimicrobial (e.g., tetracycline) and antineoplastic (e.g., urethan) agents appears to be an example of the cytotoxic type of indirect hepatotoxicity. The hepatic dysfunction and jaundice produced by the C-17 alkylated anabolic agents is an example of the cholestatic type of indirect hepatotoxicity. Most drugs that produce liver damage depend on host idiosyncracy for the adverse effect. The idiosyncracy may be a manifestation of hypersensitivity or of unique metabolism of the drug by the susceptible host. Drug-induced liver damage may be cytotoxic, causing hepatocellular jaundice; cholestatic, causing hepatocanalicular jaundice; or mixed.

684 **THE IRON CONTENT OF SUBCELLULAR FRACTION OF THE LIVER. II. ACUTE LIVER DAMAGE DUE TO CARBON TETRACHLORIDE POISONING.** *(Pol.)* Kaszewska-Jablonska, I. (1st Intern. Dis. Clin., Gdansk, Poland). *Pol. Arch. Med. Wewn.* 39(6):741-749, 1967.

The content of iron and protein in the nuclear, mitochondrial, microsomal, and cytoplasmic fractions of the liver, as well as serum iron and transaminase levels, were determined in 45 adult albino rats after poisoning with CCl_4 (0.66 ml/kg i.p.). The iron content of the liver showed a significant decrease 12-24 hr after injection of CCl_4, particularly in the cytoplasmic fraction, but returned to normal in about 48 hr. There was a marked parallel between the serum iron and serum transaminase levels, which reached a maximum about 12 hr later than the lowest drop in liver iron. Recovery was complete by 70-120 hr. The results indicate that serum iron level depends on both the severity of liver damage and the size of the liver iron depots. The initial increase in serum iron is apparently due to release of iron from the liver, while later on it reflects mobilization of body iron stores to compensate for hepatic iron deficiency.

685 **EFFECT OF CCl_4 INTOXICATION ON THE SYNTHESIS OF BETA-LIPOPROTEIN FRACTIONS IN RAT LIVER.** *(E.)* Albano, O. (Inst. Med. Path., U. Bari, Italy) and A. Francavilla. *Clin. Chim. Acta* 19(3): 363-366, 1968.

Hepatic beta-lipoprotein synthesis was studied in fasted rats given CCl_4 (0.5 ml/100 g) by stomach tube, and in normal rats. ^{14}C-leucine and ^{3}H-palmitic acid (10 μC each) were injected i.p. 1-5 hr after CCl_4 administration and the rats were killed 1 hr later. ^{14}C-leucine and ^{3}H-palmitic acid incorporation in liver and blood were reduced in CCl_4-poisoned animals, thus inhibiting beta-lipoprotein synthesis. ^{14}C-leucine incorporation was inhibited more than the ^{3}H-palmitic acid incorporation in both liver and blood. The ^{3}H:^{14}C ratio was increased in the poisoned rats. Incorporation was more inhibited in the low density than in the very low density lipoprotein fraction of liver cellular sap although radioactive incorporation was inhibited in both fractions. It is concluded that triglycerides in the liver of CCl_4-poisoned rats result from the impairment of lipid transport from the liver to the plasma.

686 **THE TOXIC EFFECT OF ALCOHOL ON THE HUMAN LIVER AND ITS ULTRASTRUCTURAL MANIFESTATIONS.** *(E.)* Albot, G. (Paris Teaching Hosp., Paris, France) and M. Parturier-Albot. *Amer. J. Gastroent.* 48(4):319-327, 1967.

Light and electron microscopy studies of ultrastructural peculiarities of three varieties of subacute alcoholic hepatitis were made on biopsy specimens from 5 afebrile, fasting patients without anesthesia. Subjects were hospitalized several days prior to biopsy and after discontinuation of alcohol intake. The predominant lesion of subacute alcoholic balloon cell hepatitis was a generalized cell ballooning with vacuolization of the giant mitochondria and partial destruction of the endothelial coat of the sinusoids. The lesions of subacute steatotic alcoholic hepatitis were similar but more pronounced, with marked lipid deposition in the hyaloplasm bounded by membranes of the smooth endoplasmic reticulum. Subacute cirrhotic alcoholic hepatitis was additionally characterized by the disappearance of the endothelial cells and of Disse's space, increased density of the blood pole of the hepatocyte, and dilatation of some bile canaliculi with ballooning of their microvilli. The lesions of subacute alcoholic hepatitis were attributed specifically to the toxic action of alcohol.

687 **INCREASED HEPATIC SYNTHESIS OF CHOLESTEROL FOLLOWING TRAUMA.** *(E.)* De Matteis, F. (Med. Res. Council Lab., Carshalton, England). *Biochem. J.* 106(2):16, 1968.

688 FATAL HEPATIC NECROSIS FOLLOWING SURGERY: POSSIBLE RELATION TO METHOXYFLURANE ANESTHESIA. [CASE REPORT] *(E.)* Lischner, M. W. (Grady Mem. Hosp., Atlanta, Ga.), G. M. MacNabb and J. T. Galambos. *Arch. Intern. Med. (Chicago)* 120(6):725-728, 1967.

689 ROUNDING OF THE LIVER SHAPE IN POSTNECROTIC SCARRING. *(Cz.)* Mildeova, E. *Cesk. Patol.* 1(3):184-187, 1967. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

690 ENZYMATIC ACTIVITIES OF THE LIVER CELL AND THEIR IMPORTANCE FOR THE EVALUATION OF LIVER INJURY. *(Cz.)* Horejsi, J. *Prakt. Lekar* 45(22):861-867, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

691 LIVER INJURY. *(Cz.)* Toberny, Z. and F. Rehak. *Prakt. Lekar* 45(3):81-85, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

692 PATHOGENIC CONSIDERATIONS IN CONNECTION WITH CARBON TETRACHLORIDE INTOXICATIONS. *(Rum.)* Manu, P. (Inst. Med. Pharm., Bucharest, Rumania), N. Preda, M. Muica and C. Dumitriu. *Med. Intern.* 20(1):56-64, 1968.

693 MEDICAL COMPLICATIONS OF ALCOHOLISM. *(E.)* Galambos, J. T. (Atlanta, Ga.). *Southern Med. J.* 61(2):129-133, 1968.

694 HEPATIC CHANGES PRODUCED BY A SINGLE DOSE OF ENDOTOXIN IN THE MOUSE. *(E.)* Levy, E. (Cent. Emek Hosp., Affula, Israel), R. J. Slusser and B. H. Ruebner. *Amer. J. Pathol.* 52(2):477-490, 1968.

See also abstract no.: 612

Viral Hepatitis

695 **HEPATITIS IN PREGNANCY.** *(Ser.)* Bobinac, E. (Doboj Gen. Hosp., Yugoslavia). *Lijecn. Vjes.* 89(9):675-682, 1967.

Among 699 women with infectious hepatitis admitted to the hospital in 1964-66, 137 (16-42 yr old) were pregnant, 68 of these in the third trimester. Of the 137 pregnant women, 117 were Moslems and 112 were multiparae. Diagnosis was based on epidemiological, clinical and laboratory findings, and therapy included diet, vitamins, broad-spectrum antibiotics and corticosteroids. Among the 34 cases in a comatose or precomatose condition on admission, 26 were in the third trimester. A total of 21 women died, including 15 in the third trimester and 6 in the second. With regard to the outcome of the pregnancy, there were 34 healthy infants, 4 spontaneous abortions, and 19 premature deliveries (only one of which lived) among women who had recovered from hepatitis. Among 23 women who still had hepatitis at the time of delivery, 21 produced live offspring. There were no congenital malformations. It is felt that viral hepatitis is a serious disease in late pregnancy, which should be treated intensively. The most severe cases are usually encountered in women from underdeveloped areas.

696 **IRON ABSORPTION IN INFECTIOUS HEPATITIS.** *(E.)* Bolin, T. (Prince Henry Hosp., Sydney, Australia) and A. E. Davis. *Amer. J. Dig. Dis.* 13(1):16-20, 1968.

Iron absorption levels were determined in 9 male patients with acute infectious hepatitis in order to establish whether iron level increase due to diet was responsible for hypersideremia. The fasting patient was given 5 mg of radioactively labeled ferrous sulfate (approximately 4 μC) in 20 ml of water. Iron absorption was investigated early in the disease and 2-3 weeks later during the recovery stage. Only two patients showed a minimal initial increase in iron absorption in the acute stage of the disease. Three patients showed 100% transferrin saturation, associated with normal iron absorption. Increased absorption of dietary iron is thus not the basis of the hypersideremia observed in infectious hepatitis.

697 **THE CONSEQUENCES OF EPIDEMIC HEPATITIS: A STUDY OF 200 CASES OVER A PERIOD OF TWO YEARS.** *(Rum.)* Zamfirescu, I. (First Infect. Dis. Clin. Colentina, Timişoara, Rumania), S. Dediu, L. Pǎun, I. Dancu, C. Isbǎşescu, N. Istodor and R. Vlad. *Med. Intern.* 20(1):73-80, 1968.

Among 200 cases (96 males and 104 females, 15-70 yr of age but most between 30 and 45) of viral hepatitis followed for 2 yr after discharge from the hospital, 65 still had various symptoms at 3 months but at 9 months all but 19 had recovered completely and at 2 yr only 16 patients showed residual symptoms. These sequellae could be grouped as follows: 3 patients with a residual cirrhotogenic syndrome (only 1.5% which is significantly lower than most reports in the literature); 3 patients with hepatomegaly: 4 with a residual necrotic syndrome; 4 with dyspepsia; one case with a biochemical syndrome due to perilobular cellular infiltration; and one case with subicteric serum bilirubin levels. During the initial hospitalization, the jaundice had lasted 7-14 days in 89 cases and more than 14 days in 35 cases, while 16 had had "severe" hepatitis and 3 had been in a coma; the diagnosis was confirmed by biopsy in 90 cases. It is suggested that the high incidence of a residual cirrhotogenic syndrome following viral hepatitis reported in the literature may be due to misdiagnosis of the initial jaundice as due to viral rather than chronic cirrhotic hepatitis.

698 **REPORT ON THE CARDIODYNAMICS OF ACUTE JAUNDICED HEPATITIS.** *(It.)* Guerricchio, G. (Civil Hosp., Matera, Italy), L. Tantalo and M. Lo Nigro. *G. Mal. Infett.* 19(8):520-525, 1967.

699 **CONTRIBUTION TO THE STUDY OF MYOCARDIAL DISTURBANCES IN CHRONIC HEPATITIS AND HEPATIC CIRRHOSIS.** *(Fr.)* Paunescu-Podeanu, A. (C. Davila Hosp., Bucharest, Rumania), H. Demirian, E. Apetrei, V. Gorcea. *Rev. Roum. Med. Int.* 4(5): 309-316, 1967.

700 **SURGICAL TREATMENT OF ENCEPHALOPATHIC HEPATITIS.** *(Sp.)* Piera Mas-Sarda, J. (Santa Cruz & San Pablo Hosp., Barcelona, Spain) and J. Figueroa Duran. *Rev. Esp. Enferm. Apar. Dig.* 26(8):1007-1021, 1967.

701 **OBSERVATIONS USING THE HEPATIC RHEOGRAPH IN ACUTE JAUNDICED HEPATITIS.** *(It.)* Guerricchio, G. (Civ. Hosp., Matera, Italy) and M. Lo Nigro. *G. Mal. Infett.* 19(8):526-530, 1967.

702 **MERCAPTOPURINE HEPATOTOXICITY IN A PATIENT WITH CHRONIC ACTIVE HEPATITIS.** *(E.)* Krawitt, E. L. (U. Iowa Coll. Med., Iowa City), J. H. Stein, W. M. Kirkendall and J. A. Clifton. *Arch. Intern. Med. (Chicago)* 120(6):729-734, 1967.

703 **EPIDEMIC HEPATITIS AND DIABETES.** *(Cz.)* Herman, B., K. Hermanova and A. Vykudal. *Vnitrni Lek.* 11(3):237-244, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

704 **SUBACUTE VIRAL HEPATITIS.** *(Cz.)* Bednar, B. and O. Sousek. *Cesk. Patol.* 1(3):175-183, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

705 **CONTRIBUTION TO THE SPECIAL EPIDEMIOLOGY OF VIRAL HEPATITIS.** *(Cz.)* Cervenka, J. *Lek. Obzor* 14(4):237-244, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

706 **HORMONES IN THE TREATMENT OF INFECTIOUS HEPATITIS.** *(Cz.)* Broz, J. *Prakt. Lekar.* 45(15/16):603-605, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

707 **THE FATE OF MURINE HEPATITIS VIRUS (MHV-3) AFTER INTRAVENOUS INJECTION INTO SUSCEPTIBLE MICE.** *(E.)* Piazza, M. (Inst. Infect. Dis., U. Naples, Italy), G. Pane and F. De Ritis. *Arch. Ges. Virusforsch.* 22(3-4):472-474, 1967.

Viral Hepatitis

708 **INFECTIOUS AND UNINFECTIOUS HEPATITIS IN PREGNANCY.** *(Cz.)* Vanista, J. (Ped. Fac., Charles U., Prague). *Cas. Lek. Cesk.* 106(49):1330-1333, 1967.

709 **SERIC NONSPECIFIC IMMUNE FACTORS IN CHRONIC HEPATITIS.** *(Rum.)* Fodor, O. (3d Med. Clin., Cluj, Rumania) and N. Parau. *Med. Intern.* 20(1): 47-58, 1968.

710 **A MORPHOLOGICAL AND FUNCTIONAL STUDY OF THE SMALL BOWEL IN CHRONIC HEPATITIS.** *(Rum.)* Prodan, P. (Intern. Med. Clin., Timişoara, Rumania), F. Bartl, G. Coreanu, F. Dinu, M. Gavrilescu, G. Nubert, G. Parota and T. Pop. *Med. Intern.* 20(1):97-102, 1968.

711 **THE CHRONIC FORMS OF VIRAL HEPATITIS.** *(Fr.)* Trad, J. and A. Praf. *Rev. Med.* (3):113-122, 1968.

712 **FUNCTIONAL EXPLORATION OF THE LIVER IN VIRAL HEPATITIS.** *(Fr.)* Boivin, P. and R. Fauvert. *Rev. Med.* (3):123-130, 1968.

713 **STUDY OF THE ELIMINATION OF SULFOBROMOPHTHALEIN IN VIRAL HEPATITIS.** *(Fr.)* Toulet, J. *Rev. Med.* (3):131-150, 1968.

714 **TREATMENT OF VIRAL HEPATITIS.** *(Fr.)* Varay, A., J. Berthelot, R. Jolly and F. Mignon. *Rev. Med.* (3):151-165, 1968.

715 **ENZYME STUDIES IN MARMOSET (NONHUMAN PRIMATE) HEPATITIS. [ORAL COMMUNICATION; 40TH ANNUAL MEETING, CENTRAL SOC. CLIN. RES.]** *(E.)* Möhr, J. R. (Chicago, Ill.), A. W. Holmes, F. Deinhardt and H. Mattenheimer. *J. Lab. Clin. Med.* 70(5):860, 1967.

716 **TREATMENT OF VIRAL HEPATITIS.** *(Fr.)* Savoye, M. B. *J. Med. Lyon* 49(1135):133-135, 1968.

717 **VIRAL HEPATITIS IN CONNECTION WITH HEMODIALYSIS AND KIDNEY TRANSPLANTATION.** *(E.)* Ringertz, O. (Karolinska Hosp., Stockholm, Sweden) and B. Nystrom. *Scand. J. Urol. Nephrol.* 1(2):192-198, 1967.

718 **THE EFFECT OF GAMMA-GLOBULIN IN PREVENTION OF FIBRINOGEN-TRANSMITTED HEPATITIS.** *(E.)* Ekblom, L. (Karolinska Hosp., Stockholm, Sweden), P. Olsson and T. Aberg. *Acta Chir. Scand.* 133(5):351-354, 1967.

719 **INFECTIOUS HEPATITIS AND DIABETES MELLITUS.** *(Cz.)* Dura, J., B. Bednar and O. Sousek. *Cesk. Patol.* 1(2):111-117, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

720 **ACUTE VIRAL HEPATITIS AND ITS SEQUELAE.** *(Cz.)* Bednar, B., E. Schon and O. Sousek. *Cesk. Patol.* 1(1):3-27, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

721 **EXPERIMENTAL MURINE HEPATITIS DUE TO VIRUS MOTOL.** *(Cz.)* Bednar, B. and E. Schon. *Cesk. Patol.* 1(1):28-36, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

722 **HISTOCHEMISTRY OF THE LIVER IN VIRAL HEPATITIS.** *(Cz.)* Lojda, Z. *Cesk. Patol.* 1(1): 37-49, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

723 **IMMUNOHISTOLOGY OF EXPERIMENTAL INFECTIOUS HEPATITIS DUE TO VIRUS MOTOL.** *(Cz.)* Jirasek, A., A. Braun and E. Schon. *Cesk. Patol.* 1(1):50-55, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

724 **ULTRASTRUCTURAL CHANGES IN VIRAL HEPATITIS.** *(Cz.)* Pith, J. *Cesk. Patol.* 1(1): 56-62, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

725 **CONTRIBUTION TO THE DIFFERENTIAL DIAGNOSIS OF INFECTIOUS HEPATITIS AND SERUM HEPATITIS.** *(Cz.)* Fingerland, A. and V. Vortel. *Cesk. Patol.* 1(2):97-105, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

726 **THE SEQUENCE OF HISTOLOGICAL CHANGES OF THE LIVER DURING THE COURSE OF ACUTE VIRAL HEPATITIS.** *(Cz.)* Bednar, B. and O. Sousek. *Cesk. Patol.* 1(2):82-89, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

727 **THE DIAGNOSTIC VALUE OF SOME HISTOLOGICAL HEPATIC LESIONS FOR THE RECOGNITION OF VIRAL HEPATITIS.** *(Cz.)* Bednar, B., D. Urbanova and O. Sousek. *Cesk. Patol.* 1(2):90-96, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

728 **VIRAL HEPATITIS AND THE ACUTE MALIGNANT PSEUDOENCEPHALITIC SYNDROME ACCOMPANIED BY FATTY DEGENERATION OF THE LIVER AND KIDNEYS.** *(Cz.)* Mildeova, E. *Cesk. Patol.* 1(2):106-110, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

See also abstract no.: 110

729 **THE RECOVERY OF EXPERIMENTAL DIETARY CIRRHOSIS. I. FUNCTIONAL AND STRUCTURAL FEATURES.** *(E.)* Takada, A. (Kanazawa U. Sch. Med., Japan), E. A. Porta and W. S. Hartroft. *Amer. J. Path.* 51(6): 929-957, 1967.

When 300 male Wistar rats were maintained for 5 months on a sucrose-Crisco diet low in protein, methionine, choline and vitamin B_{12}, 100 died, 66 developed early cirrhosis and fatty livers, and 134 survived with moderate to advanced multilobular cirrhosis. These 134 cirrhotic rats, plus 68 control rats maintained on the same diet supplemented with 0.35 mg% of choline chloride, were then used in phase II of the study, designed to clarify the relative role of protein and choline in the regression of hepatic cirrhosis. For this purpose, the rats were maintained for up to 13 weeks on diets uniformly containing 250 mg% methionine and 560 mg% cystine, but either high or low in protein and/or choline. Periodic liver function tests were carried out on the serum and the livers were studied histochemically and by electron microscopy at necropsy. Control rats, all of which received choline, thrived regardless of the protein content of the diet. Among cirrhotic rats, the highest mortality (14.7%) was observed in the group maintained on a low-protein diet deficient in choline, while in the other 3 experimental groups the mortality was about 9%. The high-protein diet also resulted in a more rapid increase in body weight, but otherwise protein *per se* had little effect on hepatic morphology or function, the most important variable being the choline content. In cirrhotic rats fed a diet supplemented with choline, regardless of the protein content, liver function tests returned to normal within 5 weeks, accompanied by a decrease in hepatic lipids and followed by a decrease in the number of ductular and mesenchymal cells. Biochemically, this was evidenced by decreases in DNA and alkali-soluble collagen, along with increases in liver RNA. No such regressive changes were observed in rats fed a high-protein diet deficient in choline. It is concluded that choline is the chief limiting factor in the recovery of hepatic cirrhosis, and that there are only quantitative differences in the mode of action between choline and methionine. It is also suggested that a favorable prognosis would be indicated by a biopsy specimen showing relatively few ductular cells, fat only within the intratrabecular cysts, and no hepatocytes within the fibrous trabeculae.

730 **THE RECOVERY OF EXPERIMENTAL DIETARY CIRRHOSIS. II. TURNOVER CHANGES OF HEPATIC CELLS AND COLLAGEN.** *(E.)* Takada, A. (Kanazawa U. Sch. Med., Japan), E. A. Porta and W. S. Hartroft. *Amer. J. Path.* 51(6):959-976, 1967.

In experiments set up precisely as in Part I of the study (see previous abstract), normal and cirrhotic rats were given i.p. injections of either 0.1 μC/g of uniformly labeled ^{14}C-proline, 0.8 μC/g of H^3-thymidine, or both, after which they were maintained on isomethionine diets containing variable amounts of protein and choline for up to 90 days. Samples of liver tissue were then studied biochemically and by autoradiography to determine the turnover rates of the hepatic cells and collagen. The half-life of the hepatocytes were significantly shorter in cirrhotic rats (6.5-9.8 days) than in normal controls (15 days in rats given a low-protein diet); in both normal and cirrhotic rats, a high-protein diet accelerated the turnover rate (half-life of 6.5 days compared to 9.8 days in cirrhotic rats on a choline-deficient diet), while choline reduced the turnover rate (half-life of 8.5 days in cirrhotic rats fed a high-protein choline-supplemented diet). Similarly, the specific activities of hepatic DNA were significantly higher in cirrhotic rats than in controls, and were increased somewhat by a high-protein diet but decreased by choline. It is suggested that there are two types of hepatocytic regeneration: one in response to the deterioration of hepatic structure and function accompanying the development of cirrhosis, and another reflecting improvement taking place as the direct result of treatment with a high-protein diet. Both choline and high-protein diets were effective in enhancing the absorption of collagen and inhibiting its new formation. Thus, while the effects on the half-life of alkali-soluble collagen were slight (increases produced by both choline and a high-protein diet), choline markedly shortened the half-life of alkali-insoluble collagen in cirrhotic rats, as did a high-protein diet in the absence of choline.

731 **METABOLIC STUDIES WITH PERFUSED CIRRHOTIC LIVER.** *(E.)* Scholz, R. (U. Michigan Med. Ctr., Ann Arbor), J. Grunst, T. Buecher, K. S. Henley and L. U. Hendelman. *Gastroenterology* 54(3):348-357, 1968.

Studies were performed on male Sprague-Dawley rats which were raised in the U. S. and then flown to Germany. Some of the rats were made cirrhotic by means of the low choline, low protein, high fat, and low vitamin B_{12} diet described by Grisham, Banson, and Hartroft. Oxygen consumption in perfused cirrhotic livers was lower than in normal controls. This appears to be due to a lower number of units capable of accepting molecular oxygen in the cirrhotic than in the normal livers. The response of the electron transport chain to the addition of 2,4-dinitrophenol was similar in the cirrhotic and the normal livers. The rate of oxidation of added ethanol was lower in the perfused cirrhotic livers than in the normal livers. The rate of release of glucose was similar in the cirrhotic and the normal livers. During 2 hr of perfusion, the production of lactate plus pyruvate as an index of glycolysis remained constant in the cirrhotic livers but fell progressively in the normal livers.

732 **GLYCOLYTIC SUBSTRATES IN CIRRHOSIS AND QUANTITATIVE UNDERNUTRITION IN THE RAT.** *(E.)* Henley, K. S. (U. Michigan Med. Sch., Ann Arbor). *J. Lab. Clin. Med.* 71(2):183-191, 1968.

Four groups of 12 rats each were used to study the concentrations of adenine nucleotides and the redox state of nicotinamide adenine dinucleotides in malnourished and cirrhotic liver. Cirrhosis was produced in 1 group of rats by a 6-month low choline diet. Another group received a restricted normal diet resulting in malnutrition and weight loss similar to that seen in cirrhotic rats. A third group received normal diets *ad libitum* for 6 months. The last group received normal diets *ad libitum*, but were younger than the third group and comparable in weight to the cirrhotic and malnourished rats. After fasting overnight, all rats were anesthetized and 1 or 3 g of liver tissue frozen *in situ* was removed. The sample was powdered, extracted with neutralized perchloric acid, centrifuged, and the supernatant made up to 25 ml with buffer. Spectrophotometric assays were made of 1 or 2 ml samples; a sham extract was used for a blank. Differences were found in substrate concentrations at various metabolic sites along the glycolysis pathway in cirrhotic and malnourished rats. These varied in magnitude, depending on which groups are compared. Substrate assays showed the tricarboxylic acid cycle activity to be depressed and hexose monophosphate shunt activity to be elevated in cirrhotic liver. Rate of substrate removal or production depends on enzyme activity, relative concentrations of substrates and cofactors, and kinetic properties of the enzymes. Comparison of substrate concentrations gives indirect insight into metabolic changes but quantitative evaluation of metabolic flow rates requires other methods.

733 ARTERIOVENOUS SHUNTS OF THE LUNGS IN CIRRHOSIS OF THE LIVER. *(Por.)* Romeiro Neto, M. M. (U. Sao Paulo, Brazil), J. V. Martins Campos and F. Linneu Pileggi. *Arq. Gastroenterol.* 4(2):93-96, 1967.

734 BANTI'S DISEASE AND CIRRHOGENIC SPLENOPATHIES. *(Rum.)* Athanasiu, A. *Med. Intern. (Bucur)* 19(12):1511-1520, 1967.

735 RESULTS OF SUPRARENAL ANASTOMOSIS IN CIRRHOSIS. *(Fr.)* Hepp, J. (Bichat Hosp., Paris, France), J. Moreaux and H. Bismuth. *Bull. Soc. Med. Hop. Paris* 118(12):1100-1107, 1967.

736 FURTHER REPORT ON PORTACAVAL TRUNCAL ANASTOMOSIS FOR CIRRHOSIS (STUDY OF 100 PATIENTS OPERATED ON BETWEEN 1959 AND 1964). *(Fr.)* Fouet, P. (Paris, France) and M. Hivet et Chevrel. *Bull. Soc. Med. Hop. Paris* 118(12):1109-1122, 1967.

737 GROWTH HORMONE AND SERUM INSULIN IN RESPONSE TO A GLUCOSE LOAD IN CHRONIC HEPATIC CIRRHOSIS. [ORAL COMMUNICATION; 40TH ANNUAL MEETING, CENTRAL SOC. CLIN. RES.] *(E.)* Samaan, N. (Iowa City, Iowa) and D. Stone. *J. Lab. Clin. Med.* 70(6):986, 1967.

738 MECHANISM OF ANEMIA IN ZIEVE'S SYNDROME. [ORAL COMMUNICATION; 40TH ANNUAL MEETING, CENTRAL SOC. CLIN. RES.] *(E.)* Balcerzak, S. P. (Columbus, Ohio), M. P. Westerman and E. W. Heinle. *J. Lab. Clin. Med.* 70(6):1024, 1967.

739 CHANGES IN SERUM IMMUNOGLOBULIN CLASS AND SUBGROUP CONCENTRATIONS IN PATIENTS WITH ALCOHOLIC CIRRHOSIS. [ORAL COMMUNICATION; 40TH ANNUAL MEETING, CENTRAL SOC. CLIN. RES.] *(E.)* Wilson, I. D. (Minneapolis, Minn.), G. R. Onstad, R. C. Williams, Jr., J. B. Carey, Jr. and W. J. Yount. *J. Lab. Clin. Med.* 70(5):879, 1967.

740 LYMPH FLOW DISTURBANCES IN INTRACTABLE ASCITES OF CIRRHOTIC PATIENTS. [ORAL COMMUNICATION; 40TH ANNUAL MEETING, CENTRAL SOC. CLIN. RES.] *(E.)* Steigmann, F. (Chicago, Ill.), D. Long and R. Mejicano. *J. Lab. Clin. Med.* 70(5):893, 1967.

741 MENINGITIC LISTERIOSIS IN A CIRRHOTIC. *(Fr.)* Cachin, M. (Cochin Hosp., Paris, France), S. Desche and P. Vergez. *Sem. Hop. Paris* 44(4):236-238, 1968.

742 FATTY ACIDS IN NORMAL AND CIRRHOTIC HUMAN LIVER. *(It.)* Salvioli, G. (Gen. Med. Ther. Clin., U. Modena, Italy) and G. Vecchi. *Fegato* 13(3):321-331, 1967.

743 DIABETES IN THE CIRRHOTIC PATIENT. *(Fr.)* Editorial. *Sem. Hop. Paris* (4):245, 1968.

744 SPLENIC PRESSURE IN CIRRHOSIS OF THE LIVER. *(Cz.)* Hauftova, D. *Vnitrni Lek.* 11(4):342-348, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

745 SELECTIVE IMMUNOGLOBULIN-A DEFICIENCY IN TWO PATIENTS WITH ALCOHOLIC CIRRHOSIS. *(E.)* Wilson, I. D. (U. Minnesota Med. Sch., Minneapolis), G. R. Onstad, R. C. Williams, Jr. and J. B. Carey, Jr. *Gastroenterology* 54(2):253-259, 1968.

746 RIEDEL'S LOBE AND CIRRHOSIS: REPORT OF A CASE. *(E.)* Keyloun, V. E. (St. Vincent's Hosp., New York City) and B. Pinkernell. *Amer. J. Dig. Dis.* 12(11):1174-1177, 1967.

747 ON CERVICAL LYMPHOVENOUS ANASTOMOSIS FOR PORTAL HYPERTENSION IN LIVER CIRRHOSIS. *(Ger.)* Schreiber, H. W. (Maria Hosp., Hamburg, Germany), W. Koch, H. V. Ackeren, T. Georgi and K. Schilling. *Deutsch. Med. Wschr.* 93(5):195-200, 1968.

748 OUR EXPERIENCE IN THE TREATMENT OF CIRRHOSIS AND ITS COMPLICATIONS. *(Sp.)* Perez Mota, A. (Nat. Inst. Prev., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 26(8):1041-1052, 1967.

749 DYSGLOBULINEMIC CIRRHOSES: HYPERMACROGLOBULINEMIC, PSEUDO-MYELOMATOUS AND CRYOGLOBULINEMIC CIRRHOSES. *(Fr.)* Varay, A. (Beaujon Hosp., Paris, France), J. Mallarme and J. D. Rain. *Arch. Mal. Appar. Dig.* 56(10):905-930, 1967.

See also abstract nos.: 110,113,599

Gallbladder and Biliary Tract Diseases

750 **SILENT LARGE SOLITARY GALLSTONE.** *(E.)* Sidenberg, S. S. (Mount Sinai and Suburb. Commun. Hosps., Cleveland, Ohio), H. Morris and J. Gilford. *Amer. J. Gastroent.* 48(5):431-439, 1967.

An analysis is presented of 6 case histories of perforation by large silent gallstones. Absence of pain at the moment of perforation was particularly noted in 3 cases. Although in 1 case perforation did not occur before surgery, the case was included to show the varied direction in which pressure from a large solitary gallstone may point. X-rays did not show the impacted stone in 2 of the 3 cases of gallstone ileus. In the third case, a small calcific nidus was noted in the films, but was disregarded as a source of the ileus. In retrospect, the nidus is seen to be the smallest portion of an enormous pure bilirubin stone. Painless gallstone perforation is explained in the light of present physiological knowledge. Early surgery is advised in large silent gallstones, whenever the patient's condition will permit anesthesia.

751 **VALUE OF ROUTINE OPERATIVE CHOLANGIOGRAMS.** *(E.)* Ferguson, W. H. (George Washington Univ. Med. Sch., Silver Spring, Md.) and J. T. Estes. *Amer. J. Gastroent.* 48(4):311-318, 1967.

Operative cholangiography was used to study 240 cases of suspected gallbladder stones. Of these, 96% were positive and only 10% required common duct exploration. Only 4 false positives resulted (2 due to air bubbles and 2 due to extrinsic node pressure in the upper pancreatic border). Unsuspected pathologies were discovered in 10%. Cases from literature not employing this technique for gallbladder diagnosis were analyzed statistically and compared with the results of this and similar studies. Without operative cholangiography, positive results were obtained in only 55.5%; if cases with palpable stones are excluded, this drops to 34.9%. Cholangiography is a simple and effective means of confirming gallstones without common duct exploration. Duct exploration increases the surgical mortality of cholecystectomy from 0.6% to 1.8%, or from 3,600 to 10,800 deaths per annum. The literature reports an incidence of overlooked stones of 3.1% to 5% in cholecystectomy without cholangiography and 0.4% with cholangiography. Operative cholangiography thus provides increased accuracy in the detection and removal of duct stones and the detection of unsuspected pathologies.

752 **RUPTURE OF THE COMMON BILE DUCT BY BLUNT TRAUMA.** *(E.)* Plewes, B. (Suite 314, 688 Coxwell Ave., Toronto 13, Ont., Canada). *Canad. Med. Ass. J.* 98(3):170-171, 1968.

The case history of a 6-yr-old girl with a ruptured hepatic duct as the result of an automobile accident is presented. Antibiotic therapy and stomach emptying failed to relieve intermittent upper abdominal pain. Radiography revealed an enlarged liver shadow and an elevated right diaphragm. An intra-abdominal lesion was preoperatively diagnosed and subsequent laparotomy revealed bile peritonitis, large pockets of encysted bile, and a common hepatic duct perforation. A T-tube was inserted into the common duct with one limb passing proximal to the perforation; a rubber drain was placed at the foramen of Winslow. Tetracycline irrigations were begun postoperatively. A rapid and uneventful recovery prompted removal of the T-tube and rubber drain after a cholangiogram 1 month postoperatively revealed no leak in the common bile duct. A gallbladder shadow was attributed to a fibrin or blood clot which was absorbed after 6 months. Reexamination 8 yr later revealed no signs or symptoms.

753 **GALLSTONE DISEASE.** *(E.)* Rains, A. J. H. (Charing Cross Hosp., London, England). *Brit. Med. J.* 1(5587):295-298, 1968.

A discussion is presented of the incidence, etiology, diagnosis and treatment of various gallstone diseases. Gallstones are found in at least 20% of women over 40 yr of age and 20% of men over 70; the incidence may vary in different countries. Stones are formed in the gallbladder or in the common bile duct, and may be composed of cholesterol, bile salts, or both; they may contain calcium carbonate and phosphate, protein, or the enzymes glucuronidase and phosphatase. Dietary excesses of carbohydrate and vitamin A deficiency have been shown clinically and experimentally to cause gallstones. High sucrose and carbohydrate diets, liver damage or selective reabsorption through the gallbladder wall decrease bile salt content, resulting in cholesterol crystallization; decreases in bile pH cause cholesterol precipitation. Exfoliated gallbladder epithelial cells, bacteria, parasites and their ova, foreign bodies, and amorphous spheroliths can form the nuclei of gallstones. Hiatus hernia, diverticulitis, pancreatitis, and acute and chronic cholecystitis are associated with cholelithiasis. Gallstones are either discovered by accident, by contrast radiography for investigation of upper abdominal symptoms or after acute symptoms referable to the biliary system develop. Cholecystotomy with drainage is still a useful emergency treatment for acute cholelithiasis. Some surgeons recommend immediate cholecystectomy for all cases.

754 **CYSTIC ARTERIAL PATTERNS IN DISEASED HUMAN GALLBLADDERS.** *(E.)* Gordon, K. C. D. (London Hosp., England). *Gut* 8(6):565-568, 1967.

The arterial patterns found in 48 diseased gallbladders were compared with those found in 75 normal gallbladders from cadavers. Gallbladder arteries were injected with Micropaque, filling the organ lumen with translucent resin and rendering the wall transparent with a clearing agent. Among the 48 surgical specimens studied, were 4 mucocoeles, 3 of which showed normal patterns while the other showed evidence of cholecystitis (thickening of the gallbladder wall). Seventeen surgical specimens containing calculi were externally normal, and 27 showed varying degrees of chronic cholecystitis (wall thickening and subperitoneal fat). In this latter group there was no filling of small vessels, there were frequently large areas of uninjected arteries, indistinguishable anastomoses, and irregular tortuous outlines of major arteries. The arterial changes demonstrated were not associated with aging, coronary thrombosis, hypertension, atheroma, or other diseases causing death. It is concluded that the characteristic changes of chronic cholecystitis are accompanied by abnormalities of gallbladder arteries which are present at an early stage of the disease and may be concerned in its etiology.

755 **INFLUENCE OF DEOXY- AND HYODEOXYCHOLIC ACIDS ON CHOLESTEROL-CHOLIC ACID-INDUCED GALLSTONE FORMATION IN MICE.**

(E.) Bergman, F. (Surg. Clin., U. Umea, Sweden) and W. van der Linden. *Acta Chir. Scand.* 133(6):479-481, 1967.

Young mice (male and female) fed a diet containing 1% cholesterol and 0.5% cholic acid for 4 months developed gallstones in a large proportion of cases despite simultaneous administration of hyodeoxycholic acid (0.5% in the diet); thus, gallstones developed in 12 of 26 treated mice and in 13 of 23 controls. Although fatty livers also developed in 21 of 26 treated mice (22 of 23 controls), hyodeoxycholic acid significantly decreased the mean serum cholesterol levels (to 176.6 mg% compared to 259.3% mg% in controls) and apparently prevented the deposition of esterified cholesterol in the liver (birefractive crystals in only 1 of 26 treated mice but in all 23 controls). In similar experiments, 0.5% deoxycholic acid was found to have essentially the same gallstone-inducing effect as cholic acid in mice on a high-cholesterol diet.

756 **BILE FLOW, pH, ELECTROLYTES, AND BILIRUBIN IN HEPATIC BILE FOLLOWING CHOLEDOCHOTOMY.** *(E.)* Guldhammer, E. H. (Frederiksborg Cent. Co. Hosp., Hillerød, Denmark) and K. Kjeldsen. *Acta Chir. Scand.* 133(6):483-490, 1967.

Daily determinations of the 24-hr bile output, its pH, and the levels of sodium, potassium, bicarbonate, chloride, bilirubin and pancreatic diastase in 25 patients (10 men and 15 women, average age 60 yr) who underwent cholecystectomy and choledochotomy or choledocholithotomy for cholelithiasis (22 of 25 had stones in the common bile duct) showed that the hepatic bile resembles the serum in chemical composition; this is unchanged by surgery or low-level biliary drainage. Biliary flow increased from an average of 240 ml on the 1st day to 460 ml on the 7th day, and was an average of 160 ml/day higher in patients with jaundice than in those without. The pH was 7.25-7.45, and the concentrations of bicarbonate, chloride, potassium and sodium (in mEq/liter) were 25-28, 106-116, 4.2-4.8 and 149-153, resp. One patient with hyponatremia had the same biliary sodium concentration as the other patients, indicating that the liver lacks the ability to retain sodium. The bilirubin content varied within wide limits (7-130 mg%) and was independent of the presence of jaundice. Between the 1st and the 7th-9th postoperative day, the bilirubin content fell from an average of 150 to 40-50 mg%, which is greater than the increase in biliary output. The fact that this occurred in the presence of high serum bilirubin values is ascribed to binding between bilirubin and the plasma proteins.

757 **BILIARY SURGERY IN THE SOUTHWESTERN AMERICAN INDIAN.** *(E.)* Sampliner, J. E. (USPHS Indian Hosp., Gallup, N. M.) and D. J. O'Connell. *Arch. Surg.* 96(1):1-3, 1968.

A review of 946 major operations carried out in a 3-yr period revealed that 249 (26.3%) on 237 patients (59 men and 178 women, 17-104 yr old) involved procedures on the biliary tract; the average age of the male patients was 65.5 yr, compared to 30 yr for the females. The most common procedure was cholecystectomy (228 cases), either alone (138 cases) or with common bile duct exploration (90 cases); the only operative mortality was in 4 cases among 18 subjected to cholecystostomy (overall operative mortality of 1.6%). Nonfatal complications were encountered in 59 cases and included pulmonary disease (23 cases) and wound infection (10 cases). In 82 cases, the excised gallbladders yielded a positive culture. Carcinoma of the gallbladder was found in 9 cases (an incidence of 3.8% compared to 0.5-3% among Caucasians treated elsewhere), all with associated cholelithiasis. Cholecystoenteric fistulas were found in 3 cases, and common duct stones in 18.1% (compared to 10.4% among Caucasians). The presence of a common duct stone was usually foretold by gallbladder stones less than 1 cm in diameter and by high alkaline phosphatase and serum bilirubin values. The average age of presentation for biliary surgery is significantly lower among Indians than among Caucasians.

758 **THE POST-CHOLECYSTECTOMY SYNDROME.** *(Por.)* Figueiredo, E. (Gen. Polyclin., Rio de Janeiro, Brazil) and A. Vasconcellos Pessõa. *Brasil Med.* 81(6):391-393, 1967.

In a brief review, the residual symptoms following cholecystectomy are classified etiologically into four major groups: 1) those due directly to the operation (residual calculi, cicatricial stenosis, a long stump, biliary fistula, adhesions, neuroma, foreign bodies); 2) those due to biliary disease unaffected by the operation (sclerosis of the sphincter of Oddi, chronic inflammation of the bile duct, hepatitis, chronic pancreatitis, intrahepatic calculi, formation of new biliary calculi, incipient tumors); 3) those due to unrelated factors such as allergy, intestinal, gastroduodenal, renal or neuroautonomic disturbances, nonbiliary pancreatitis, adnexitis or diaphragmatic hernia; and 4) the true post-cholecystectomy syndrome represented by functional disturbances resulting from readaptation of the biliary system and the attempt to compensate for the absence of a gallbladder. The latter can be subdivided into various disturbances related directly to the extirpation of the gallbladder, and dilation of the common bile duct. The prophylaxis and treatment of these disorders is briefly discussed. 11 refs.

759 **A BRIEF NOTE ON ANOMALIES OF THE BILIARY TRACT.** *(Por.)* Pinheiro Magalhães, J. (Gen. Polyclin., Rio de Janeiro, Brazil). *Brasil Med.* 81(6):389-390, 1967.

The point is made that accidental surgical trauma to the biliary tract resulting from developmental anomalies of which the surgeon is unaware may be more serious than the original condition prompting the operation. Such surgical errors include ligating the right branch of the hepatic artery or hepatic duct instead of the cystic artery or cystic duct, and simultaneous ligation of both the cystic duct and the common hepatic duct.

760 **THE CAUSES OF STENOSIS OF THE BILE DUCTS AND THE RESULTS OF RECONSTRUCTION BY SUTURE OF THE CHOLEDOCHUS.** *(It.)* Zenker, E. (Surg. Clin., U. Monaco, Germany), A. Grabiger and R. Pilchmayr. *Chir. Gastroent.* 1(4):455-460, 1967.

761 **POST-GASTRIC RESECTION BILIARY LITHIASIS.** *(Sp.)* Arzua Zulaica, E. (Bilbao, Spain). *Rev. Esp. Enferm. Apar. Dig.* 26(10):1284-1289, 1967.

762 **CHRONIC NONCALCULUS CHOLECYSTITIS.** *(Sp.)* Penarroja Ragaza, J. (Med. Fac., Valencia U., Spain), and P. Zaragoza Garcia. *Rev. Esp. Enferm. Apar. Dig.* 26(10):1243-1274, 1967.

763 MUCOPOLYSACCHARIDES AND THEIR SIGNIFICANCE IN GALLSTONE FORMATION. *(E.)* Nakamura, N. (Tohoku U. Sch. Med., Sendai, Japan). *Tohoku J. Exp. Med.* 93(3):235-247, 1967.

764 AN UNCOMMON COURSE OF BILIARY ILEUS. *(Cz.)* Jílek, J. *Prakt. Lekar* 45(21):812-813, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

765 ANOMALIES IN THE BILIARY TRACT, A HAZARD IN GALLBLADDER SURGERY. *(E.)* Chappell, F. (Baptist Memorial Hosp., Memphis, Tenn.). *Memphis and Mid-South Med. J.* 43(2):59-60, 1968.

766 THE ROLE OF ODDI'S SPHINCTER IN GALLBLADDER SURGERY. *(Fr.)* Roux, M. (Vaugirard Hosp., Paris, France), M. Arsac, P. Vayre and A. Farah. *Rein Foie* 8:86-98, 1966.

767 FOREIGN BODY IN THE GALLBLADDER. *(Cz.)* Kosta, D. and J. Kochan. *Cesk. Radiol.* 19(2):142-144, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967]

768 CHOLESTASIS AND SPLENOPORTOGRAPHY. *(Cz.)* Chudacek, Z. and J. Sebor. *Cesk. Radiol.* 19(4/5):323-325, 1965. [Taken from: Annual of Czech. Med. Lit., Prague, 1967.]

769 TRAUMATIC RUPTURE OF THE GALLBLADDER. *(E.)* Andrews, E. C. (San Antonio, Texas) and J. E. Carter. *Texas Med.* 64(2):58-60, 1968.

770 SIGNIFICANCE OF INTRA- AND EXTRAHEPATIC CHOLESTASIS IN THE ICTERIC PICTURE. *(Sp.)* Meeroff, M. *Orientac Med.* 16(781):734, 1967.

771 OPERATIONS ON BILIARY TRACT IN PATIENTS SUFFERING FROM DIABETES MELLITUS. *(E.)* Svoboda, Z. and Z. Vahala. *Acta Univ. Carol. Med.* 11(2%):211-219, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

772 CHOLELITHIASIS DEVELOPING AFTER VAGOTOMY; A PRELIMINARY REPORT. *(E.)* Miller, M. C. (Montreal, Canada). *Canad. Med. Ass. J.* 98(7):350-354, 1968.

773 A DISORDER OF COPPER METABOLISM TREATED WITH PENICILLAMINE IN A PATIENT WITH PRIMARY BILIARY CIRRHOSIS AND RENAL TUBULAR ACIDOSIS. *(E.)* Leeson, P. M. (Leeds Gen. Infirm., England) and P. Fourman. *Amer. J. Med.* 43(4):620-635, 1967.

774 TYPES OF INTRAHEPATIC CHOLESTASIS. *(Sp.)* Aschkenazy, S. *Orientac. Med.* 16(781):735, 1967.

775 TECHNIC OF EXTRACTION OF HEPATIC DUCT CALCULI WITH MODIFIED FOGARTY CATHETER AND REPORT OF A CASE. *(E.)* Berman, I. R. (New York U. Med. Ctr., New York City) and R. B. Pfeffer. *Amer. J. Surg.* 114(6):969-971, 1967.

776 A CATHETER FOR CONTROLLED BILIARY DRAINAGE. *(E.)* Thorbjarnarson, B. (New York Hosp. Cornell Med. Ctr., New York City). *Arch. Surg.* 95(6): 946-947, 1967.

777 A NEW T TUBE FOR INTERMITTENT OCCLUSION OF THE COMMON DUCT. *(E.)* Ehrlich, E. W. (Hahnemann Med. Coll. Hosp., Philadelphia, Pa.). *Arch. Surg.* 95(6):944-945, 1967.

778 PREOPERATIVE DIAGNOSIS OF CARCINOMA OF THE GALLBLADDER BY PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. *(E.)* McNulty, J. G. (Royal Free Hosp., London, England). *Amer. J. Roentgen.* 101(3):605-607, 1967.

779 AGENESIS OF THE GALLBLADDER. *(E.)* Navani, S. V. (Boston City Hosp., Mass.), W. L. Wilde and R. Kim. *Amer. J. Roentgen.* 101(3):625-627, 1967.

780 HEPATICOJEJUNOSTOMY: MODIFIED LONGMIRE OPERATION FOR BILE DUCT CARCINOMA. *(E.)* Sullivan, R. C. (Vet. Admin. Hosp., Denver, Colo.) and T. D. Faris. *Amer. J. Surg.* 114(5):722-725, 1967.

781 GAS-CONTAINING GALLSTONES: AN UNUSUAL RADIOLOGIC CLUE IN THE DIAGNOSIS OF ACUTE CHOLECYSTITIS. REPORT OF A CASE. *(E.)* Babb, R. R. (Mercy Hosp., Baltimore, Md.), T. B. Cockey, III and V. M. Smith. *Amer. J. Dig. Dis.* 12(10):1067-1072, 1967.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available, free to qualified interested investigators and practitioners, citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology has accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis and Metabolic Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus.* For journals not covered by *Index Medicus,* the abbreviations (with some modifications) found in *World Medical Periodicals,* 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fr.	French	Ser.	Serbo-Croatian
Ger.	German	Sl.	Slovak
Gr.	Greek	Sp.	Spanish
Heb.	Hebrew	Sw.	Swedish
Hun.	Hungarian	Th.	Thai
Ic.	Icelandic	Turk.	Turkish
In.	Indonesian	Uk.	Ukrainian

Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	μM	micromolar
ADP	adenosine diphosphate	mC, μC	milli-, microcurie(s)
AMP	adenosine monophosphate	mg	milligram(s)
ATP	adenosine triphosphate	min	minute(s)
C	degrees centigrade	ml	milliliter(s)
cm	centimeter(s)	mm	millimeter(s)
CNS	central nervous system	MTD	maximum tolerated dose
cpm	counts per minute	ng	nanogram (10^{-9})
DNA	deoxyribonucleic acid	pg	picogram (10^{-12})
e.g.	for example	p.o.	orally
g	gram(s)	ppm	parts per million
μg	microgram(s)	r	Roentgen
hr	hour(s)	RBC	red blood cells (erythrocytes) or count
i.m.	intramuscular	resp.	respectively
i.p.	intraperitoneal	Rev.	review (only in citations)
IU	international unit(s)	RNA	ribonucleic acid
i.v.	intravenous	s.c.	subcutaneous
kg	kilogram(s)	sec	second(s)
LD_{50}	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase	SGPT	serum glutamic-pyruvic transaminase
m	meter(s)	U	unit(s)
M	molar	UV	ultraviolet
mEq	milliequivalent(s)	WBC	white blood cells (leukocytes) or count
mM	millimolar	yr	year(s)

PRE-CLINICAL SCIENCES
GENERAL

5 THE PHYSIOLOGIC SIGNIFICANCE OF INTRALUMINAL PRESSURE CHANGES IN ELATION TO PROPULSION AND ABSORPTION IN THE UMAN JEJUNUM. *(E.)* Barreiro, M. A. (Royal Victoria osp., Montreal, Canada), R. D. McKenna and I. T. Beck. *ner. J. Dig. Dis.* 13(3):234-251, 1968.

udad-propagated wave patterns and their relationship to the fect of motility on the propulsion and absorption of intraminal contents were studied in a 25 cm jejunal segment of healthy subjects. The method allowed simultaneous rerding of intraluminal pressure changes with multicatheter bes, determination of transit time by indicator-dilution chniques and assessment of the absorption of glucose and lose under basal conditions. The mean value of transit time r the jejunal segment after 54 determinations was 10.9 ± 6.2 n. Higher values of motility per unit time were associated th shorter transit times when the motility/min values obtained om the evaluation of 31 tracings by planimetry and from 47 cordings by the wave count method were correlated with their spective transit times. A constant infusion of a 37C isotonic lution at a rate of 10 ml/min did not influence the motility d the transit time. Caudad-propagated motility patterns were sociated with shorter transit times than were quantitatively nilar uncoordinated motility patterns. Bidirectional and phalad-propagated activity was associated with longer transit nes. A significant correlation in 42 experiments was seen beeen the values of xylose absorption and transit time, indicatg that longer transit times were associated with increased abrption.

'86 SO-CALLED PYLORIC HYPERTROPHY IN ANIMAL EXPERIMENTS. *(Ger.)* Heinisch, H. M. Pediat. Clin., U. Cologne, Germany). *Klin. Wschr.* 45(24):1251-252, 1967.

xperiments in rabbits designed to investigate the behavior of e antral musculature during chronic mechanical overload and istention of the stomach are reported briefly, together with a eview of the literature (23 refs.). In rabbits in which chronic ibileus was produced by placing glass beads or rubber bags lled with lead shot in the gastric fundus, peristalsis was found be decreased in the lesser curvature near the antrum but increased in the antrum itself. After only 4 weeks, hypertrophy f the antral tunica muscularis propria was noted which resemled the picture in hypertrophic pyloric stenosis of infants. It suggested that this hypertrophy is the result of a compensaion mechanism for reduced gastric function, and that pyloric tenosis is the result of pathological overcompensation for the ffects of prolonged gastric distention, gastritis, or decreases in astric motility.

787 ANTIPERISTALTIC JEJUNAL INTERPOSITIONING BETWEEN STOMACH AND DUODENUM AND REVERSAL OF JEJUNAL SEGMENTS: EXPERIMENTAL STUDIES WITH CLINICAL APPLICATIONS. *(E.)* Amdrup, E. (Inst. Exp. Surg. Res., U. Copenhagen, Denmark), B. M. Sorensen and S. Walbom-Jorgensen. *Amer. J. Dig. Dis.* 12(10):1004-1016, 1967.

Comparative studies in 24 dogs, 16 of which received antiperistaltic loops of small intestine, either in the jejunum 100 cm from the Treitz ligament (12 dogs) or between the stomach and duodenum following antrectomy (4 dogs), while the others received isoperistaltic segments of the same length (10-15 cm in the jejunum and 4-6 cm between the stomach and duodenum), demonstrated that the interposition of antiperistaltic bowel segments is followed by severe gastrointestinal retention, loss of appetite and weight loss. The comparable operations in control animals given isoperistaltic loops were well tolerated. Interposition of antiperistaltic loops was not followed by vomiting, diarrhea, increased fat excretion, or changes in serum protein and electrolyte levels. Resection of the interposed segment, however, revealed increasing dilatation in the oral direction and retention of dried bowel contents or food fragments in the intestine and stomach, resp. There was a prolific growth of *Escherichia coli* and *Clostridium welchii* in the stagnated contents, and one dog in which the antiperistaltic loop was inserted between the stomach and duodenum developed a gastric ulcer. It is concluded that differences in diet may enable human subjects treated for dumping syndrome or chronic diarrhea to tolerate this procedure better than dogs, but it would be advisable to use relatively short segments and to supplement the operation, in the case of interposition between the stomach and duodenum for dumping syndrome, by vagotomy.

788 ENTEROCHROMAFFIN CELLS AND 5-HYDROXYTRYPTAMINE IN THE HUMAN INTESTINAL TRACT. *(E.)* Pentilla, A. (Dept. Anat., U. Helsinki, Finland) and M. Lempinen. *Gastroenterology* 54(3):375-381, 1968.

The number and histochemical properties of enterochromaffin cells and the relation of this cell type to intestinal 5-hydroxytryptamine content were determined by fluorescence in 32 surgically-removed human biopsy specimens. The number of enterochromaffin cells and the 5-hydroxytryptamine content were greatest in the duodenum, decreasing in the caudal direction of the intestinal tract. Most intestinal 5-hydroxytryptamine is located in the enterochromaffin cell system; the number of enterochromaffin cells and the 5-hydroxytryptamine content are directly proportional. It is possible that enterochromaffin cells secrete 5-hydroxytryptamine into the intestinal lumen, thus regulating intestinal motility.

789 HISTOCHEMICAL STUDIES OF THE ENZYMES IN NORMAL GASTRIC MUCOSA. *(Jap.)* Miyoshi, A. (Fac. Med., Kyoto U., Japan) and Y. Okuda. *Jap. Arch. Intern. Med.* 14(10):295-304, 1967.

Histochemical studies were carried out on specimens of normal human gastric mucosa obtained by suction biopsy (Crosby capsule) from the fundic and pyloric regions. The results showed that alkaline phosphatase is found only in the endothelium of the small blood vessels and not in the mucosal cells *per se.* Acid phosphatase was found only in the chief cells and in some of the gland cells from the pyloric region, while adenosine triphosphatase was found in the parietal cells and small vessel endothelium, but not in the chief cells or pyloric glands. Leucine aminopeptidase seems to be absent from the normal human gastric mucosa. Relatively little β-glucuronidase activity was found in the chief cells, mucous cells, or superficial epithelial cells, with more in the parietal cells and pyloric glands. Nicotinamide-adenine dinucleotide diaphorase was present in significant amounts only in the surface epithelial cells and parietal cells of the fundic region. The various dehydrogenases (succinic, isocitric, glutamic, glycerophosphate, lactic and glucose-6-phosphate) showed generally strong activity in the parietal cells and weak activity in the chief cells and mucous cells of the fundus. All but glycerophosphate dehydrogenase were also relatively strong in the pyloric glands. However, the surface epithelial cells of the fundic region showed very little glutamic and glucose-6-phosphate dehydrogenase and no succinic dehydrogenase, although isocitric, glycerophosphate, and lactic dehydrogenase were present in large amounts.

790 **SYNTHESIS OF UROBILINOGEN BY BROKEN CELL PREPARATIONS OF INTESTINAL BACTERIA.** *(E.)* Troxler, R. F. (Boston U. Sch. Med., Mass.), N. H. Dawber and R. Lester. *Gastroenterology* 54(4):568-574, 1968.

In experiments with the mixed flora isolated from human feces (anaerobically in a New Brunswick fermentator at 37C), bilirubin was converted to urobilinogen by either the intact bacteria, frozen and thawed bacteria, or bacterial cell preparations disintegrated by ultrasound (20-kc Branson sonic oscillator) in 0.1 M phosphate buffer (pH 8.0), provided the reaction was carried out under strictly anaerobic conditions (evacuated Thunberg tubes). The broken-cell preparations were inactivated by boiling or dialysis. After centrifugation at 105,000 x g, recombination of the pellet and supernatant was required. Urobilinogen was produced even more rapidly from mesobilirubin than from bilirubin, indicating that mesobilirubin is probably an intermediate in the reaction. Urobilin obtained in this way was essentially indistinguishable from synthetic urobilin with respect to spectroscopic properties, melting point, and chromatographic behavior. In other experiments, homogenates of livers from male Sprague-Dawley rats, prepared in the same buffer system, were found to be unable to convert bilirubin to urobilinogen.

791 **MESENTERIC FLOW AND "DUMPING SYNDROME" INDUCED IN NORMAL AND VAGOTOMIZED DOGS.** *(It.)* Bertini, D., G. P. Novelli and A. Celiberti. *Arch. Atti Soc. Ital. Chir.*, pp. 386-389. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965]. Rome, E.M.E.S., 1967. 627pp.

792 **VARIATIONS IN MESENTERIC FLOW PRODUCED BY VAGOTOMY.** *(It.)* Bertini, D., G. P. Novelli and A. Celiberti. *Arch. Atti Soc. Ital. Chir.*, pp. 390-393. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967, 627pp.

793 **EFFECT OF ISOPROTERENOL ON CALCIUM, PROTEIN, AND ELECTROLYTES OF RAT SUB MAXILLARY GLAND.** *(E.)* Dreisbach, R. H. (Stanford U. Sch. Med., Palo Alto, Calif.). *Proc. Soc. Exp. Biol. Med.* 126(1):279-281, 1967.

794 **ADENOSINE PHOSPHATE OF RAT SALIVARY AND LACRIMAL GLANDS *IN VITRO.*** *(E.)* Dreisbach, R. H. (Stanford U. Sch. Med., Palo Alto, Calif.) and E. Gerlach. *Proc. Soc. Exp. Biol. Med.* 126(1):281-282, 1967.

795 **HEMOGLOBIN AS A BACTERIAL VIRULENCE ENHANCING FACTOR IN FLUIDS PRODUCED IN STRANGULATION INTESTINAL OBSTRUCTION.** *(E.)* Bornside, G. H. (Louisiana State U. Sch. Med., New Orleans) and I. Cohn, Jr. *Amer. Surg.* 34(1):63-67, 1968.

796 **THE EFFECT OF BILE SALTS ON THE BINDING OF BILIRUBIN BY PLASMA PROTEINS. [*IN VITRO* STUDY].** *(E.)* Fulop, M. (Albert Einstein Coll. Med., New York, N. Y.) and J. Sandson. *Clin. Sci.* 33(3):459-469, 1967.

797 **PHYSIOLOGY OF THE DIGESTIVE TRACT.** *(E.)* Davenport, H. W. (Dept. Physiol., U. Michigan, Ann Arbor). Chicago, Year Book Med. Publ., 1966. 230 pp.

798 **A CONSTANT FLOW APPARATUS FOR MEASURING RADIOACTIVE ION EFFLUXES FROM GUINEA-PIG TAENIA COLI.** *(E.)* Brading, A. F. (Dept. Pharmacol., U. Oxford, England). *J. Physiol.* 192(3):15P-16P, 1967.

799 **THE EFFECTS OF ALTERATION OF CO_2 AND pH ON INTESTINAL BLOOD FLOW IN THE CAT.** *(E.)* McGinn, F. P. (Dept. Physiol., King's Coll., London, England), D. Mendel and P. M. Perry. *J. Physiol.* 192(3):669-680, 1967.

800 **SURGERY OF THE DIGESTIVE SYSTEM IN THE RAT.** *(E.)* Lambert, R. (Edouard Herriot Hosp., Natl. Inst. Hyg., Lyon, France) [translated from the French by B. Julien] Springfield, C. C. Thomas, 1965. 501

801 **STIMULATION OF PROTEIN AND RIBONUCLEIC ACID SYNTHESIS IN RAT SUBMAXILLARY GLAND BY ISOPROTERENOL.** *(E.)* Barka, T. (Mt. Sinai Sch. Med., New York City). *Lab. Invest.* 18(1):38-41, 1968.

802 **ETHIONINE-INDUCED CHANGES IN SALIVARY GLANDS.** *(E.)* Ulmansky, M. (Hebrew U. Hadassah Med. Sch., Jerusalem, Israel) and H. Ungar. *Lab. Invest.* 17(3):249-254, 1967.

803 **EXPERIMENTAL ARREST AND INDUCTION OF LYMPHOID DEVELOPMENT IN INTESTIN LYMPHOEPITHELIAL TISSUES OF RABBITS.** *(E.)* Perey, D. Y. E. (Variety Club Heart Hosp., U. Minnesota, Minneapoli and R. A. Good. *Lab. Invest.* 18(1):15-26, 1968.

GENERAL

04 **REACTIVITY EVIDENCE FOR HOMOLOGIES IN PANCREATIC ENZYMES.** *(E.)* Zendzian, N. (Sch. Med. Pharm., State U. New York, Buffalo) and A. Barnard. *Arch. Biochem.* 122(3):714-720, 1967.

05 **DISTRIBUTION OF PANCREATIC RIBONUCLEASE, CHYMOTRYPSIN, AND TRYPSIN IN ERTEBRATES.** *(E.)* Zendzian, E. N. (Sch. Med. Pharm., ate U. New York, Buffalo) and E. A. Barnard. *Arch. Biochem.* 2(3):699-713, 1967.

06 **INTRODUCTION TO GASTROINTESTINAL PHYSIOLOGY.** *(E.)* Glass, G. B. J. (New York Med. Coll., N. Y.). London, Englewood Cliffs & Toronto, Prentice-Hall, 1968, 207 pp.

807 **TECHNIQUE FOR THE CONSTRUCTION OF A HEIDENHAIN POUCH IN THE DOG.** *(Fr.)* Mignin, M. (Bichat Hosp., Paris, France) and S. Bonfils. *Presse Med.* 75(46):2337-2339, 1967.

808 **CLEARANCE OF THE GASTRIC MUCOSA.** *(Rev.)(E.)* Jacobson, E. D. (U. Oklahoma Med. Ctr., Oklahoma City). *Gastroenterology* 54(3):434-448, 1968.

CELLULAR STRUCTURE AND MORPHOLOGY

809 **ULTRASTRUCTURAL CHANGES OF THE PIG LIVER FOLLOWING VASCULAR INTERRUPTION.** *(E.)* Slagel, D. E. (U. Kentucky Med. Ctr., Lexington) and B. Eiseman. *Israel J. Med. Sci.* 4(1):8-20, 1968.

The ultrastructure of four groups of pig livers are described: Group 1: Liver fixed immediately following sacrifice. Group 2: Liver excised from live donor and allowed to cool for 4½ hr at room temperature. Group 3: Liver left within the abdomen of a cadaver for 30 min prior to fixation. Group 4: Liver left within the abdomen of a cadaver for 1 hr prior to fixation. Damage evident by electron microscope examination was minimal in the livers excised and allowed to cool for 4½ hr at room temperature. It was limited to moderate reduction in glycogen content; loss of mitochondrial matrix granules; vesiculation of smooth endoplasmic reticulum and occasional rupture of the plasma membrane adjacent to hepatic sinusoids. The liver left at 38C within the cadaver for 30 min showed evidence of definite degeneration with extensive intracellular edema; occasional rupture of the cell membrane where it opened on to the space of Disse; cytoplasmic vacuolization; swollen and misshapen mitochondria; complete loss of glycogen deposits; extensive vesiculation of both smooth and rough endoplasmic reticulum; swelling of microvilli in bile canaliculi and appearance of cytosomes. The liver left within the cadaver at 38C for 1 hr presented ultrastructural evidence of advanced cellular deterioration. In addition to the necrotic changes described above it demonstrated disintegrated mitochondria, numerous cytosomes filled with debris of broken organelles, and complete disorganization of the endoplasmic reticulum. The cell nucleus and its nucleoplasm showed remarkable resistance to this degree of ischemia. These anatomic findings correlate closely with the previous metabolic studies on perfused livers. They emphasize the importance of immediate harvest and cooling of a liver prior to its use as a homograft or as a temporary extracorporeal heterograft.

810 **EFFECT OF WHOLE-BODY 60 CO-IRRADIATION OF HISTOCHEMICAL PATTERN OF GASTRIC MUCOSA IN THE DOG.** *(Cz.)* Parizek, J., B. Fixa, O. Komarkova, J. Kos, J. Vycichl and F. Langr. *Sbor. Ved. Prac. Lek. Fak. Karl. Univ.* 8(1):3-20, 1965. [Taken from: 1965 Annual of Czech. Med. Lit., Prague, 1967.]

811 **ENTEROCHROMAFFIN CELLS OF THE SMALL INTESTINE.** *(E.)* González-Angulo, A. (Natl. Med. Cent., Mexican Inst. Soc. Sec., Mexico City), E. Yabur and L. Landa. *Gastroenterology* 53(5):745-748, 1967.

ABSORPTION

812 EFFECT OF THYROID HORMONES ON THE INTESTINAL TRANSPORT OF VALINE *IN VITRO*. *(E.)*

Islam, S. (Indiana U. Sch. Med., Indianapolis), S. Reiser and P. A. Christiansen. *Amer. J. Dig. Dis.* 13(3): 266-274, 1968.

Isolated intestinal sacs prepared (50 days after surgery) from thyroidectomized-parathyroidectomized, thyroxine-injected, and control male albino Wistar rats were used to study the effects of thyroid hormones on intestinal amino acid transport, using 3 mM solutions of radioactive and nonradioactive valine; specimens were incubated 1 hr in Krebs-Ringer bicarbonate medium. Valine transport from mucosa to serosa was expressed by the following parameters: inside:outside valine concentration ratio; net transport; final valine concentration difference between inside and outside of the sac; and tissue uptake. Thyroxine injection significantly decreased all parameters, while thyroidectomy significantly increased all parameters. Thyroxine injections in thyroidectomized rats reduced valine transport parameters to control levels. Parathyroid hormone deficiency had no significant effect on valine transport. Serum glutamic oxalacetic transaminase levels, determined in all rats, were inversely proportional to the thyroid status of the rats.

813 ABSORPTIVE FUNCTION OF INTESTINAL METAPLASIA OF THE STOMACH. *(E.)*

Siurala, M. (Meilahti Hosp., Helsinki, Finland) and S. Tarpila. *Scand. J. Gastroent.* 3(1):76-79, 1968.

The absorption of fatty acids and medium and long-chain triglycerides was observed in gastric and duodenal biopsy specimens from 30 patients, of whom 12 had diffuse intestinal metaplasia of the stomach while the rest had normal gastric mucosa, superficial gastritis, or atrophic gastritis without intestinal metaplasia. Triolein, medium-chain triglyceride and oleic acid emulsions were introduced under pressure into the stomach and biopsy specimens obtained under X-ray television before and 30 min, 60 min, 2 hr, 4 hr, and 24 hr after emulsion introduction. Specimens were examined by light and electron microscope after formalin fixation and Oil red O staining. Small intestine fatty acid and triglyceride uptake was rapid, but intestinalized gastric mucosa uptake of long-chain triglycerides was rare. Medium-chain triglycerides were better absorbed by metaplastic tissue, although not as well as by intestinal mucosa. Oleic acid absorption was greater than medium-chain triglyceride absorption in metaplastic cells. Significant quantitative differences in the functional capacity of intestinal metaplasia, stomach, and true intestinal epithelium are suggested.

814 ISOSMOTIC ABSORPTION OF FLUID FROM RAT JEJUNUM *IN VITRO*. *(E.)*

Lee, J. S. (U. Minnesota Med. Sch., Minneapolis). *Gastroenterology* 54(3):366-374, 1968.

The effects of mucosal fluid osmolarity, solute and glucose concentrations, and intraluminal pressure on water and solute absorption were studied in isolated perfused rat jejunum segments. The mucosal perfusion solution was a bicarbonate-buffered salt solution having an osmolarity of 300 milliosmoles; in some experiments, NaCl concentration was varied or partially replaced. The serosa was perfused with liquid petrolatum. Na, K, Cl, Ca, and glucose concentrations and osmolarity were determined in absorbed fluid. Water absorption was inversely proportional to mucosal fluid osmolarity; absorbed fluid and mucosal fluid osmolarities were always the same. Glucose and calcium concentration ratios (absorbed fluid concentration:mucosal fluid concentration) varied directly with mucosal fluid osmolarity; the Na concentration ratio was slightly greater than unity with hypotonic mucosal fluid and less than unity with isotonic or hypertonic solutions. K and Cl ratios were always less than unity. Hypertonicity due to excess NaCl, mannitol, sucrose, or urea increased the glucose and decreased the Na concentration ratios; in the presence of mannitol, sucrose, and urea, the Na ratio was greater than unity. The K ratio was less than unity in all solutions except urea; the Ca ratio was greater than unity in solutions hypertonic with mannitol or sucrose. The Cl concentration ratio was less than unity in all cases. Water absorption decreased with hypertonic mucosal fluids, especially in the presence of excess mannitol and sucrose. When glucose concentrations were increased, water absorption and the glucose concentration ratio decreased, the Na ratio increased and the K and Cl ratios remained unchanged. Increases in water and total solute absorption rates at higher intraluminal pressures were proportional to one another, but the glucose absorption rate increased more rapidly than the total ion absorption rate. The results demonstrate that absorbed fluid is always isosmotic to mucosal fluid, regardless of mucosal fluid osmolarity or concentration or the pressure of intraluminal distension.

815 EFFECT OF A SYNTHETIC GASTRIN-LIKE PENTAPEPTIDE UPON THE INTESTINAL TRANSPORT OF SODIUM, POTASSIUM, AND WATER. *(E.)*

Gingell, J. C. (Royal Infirm., Cardiff, Wales), M. W. Davies and R. Shields. *Gut* 9(1):111-116, 1968.

The movement of sodium, potassium and water into and out of isolated segments (Thiry-Vella fistulas) of the jejunum, ileum or colon of 5 dogs was studied in vivo during the i.v. infusion of a synthetic gastrin-like pentapeptide (I.C.I. 50,123) at doses of 4 and 8 μg/kg/hr. In controls, sodium and water was absorbed in all three segments (most rapidly by the ileum and colon), while potassium was absorbed in the colon but secreted by the small intestine. Although the pentapeptide had no effect on the net movement of any of these substances in the colon, it did accelerate the entry of potassium into the lumen of all three segments. The pentapeptide also had no effect on sodium and water transport in the jejunum. In the ileum, the rates of absorption of water and sodium were markedly decreased. When the pentapeptide was infused at a dose of 4 μg/kg/hr, potassium secretion was accelerated in both the jejunum and the ileum, but at 8 μg/kg/hr this was maintained only in the jejunum. At the lower dose, there was also a significant increase in the concentration of potassium in the lumen of the small intestine. It is concluded that the pentapeptide has a direct, specific effect on the small intestinal mucosa. The suggestion is made that these effects may be related to the changes in water and electrolyte metabolism observed in cases of the Zollinger-Ellison syndrome, due to secretion of a gastrin-like hormone by the pancreatic adenoma.

16 **ABSORPTION OF FOLIC ACID IN VARIOUS SEGMENTS OF THE GASTROINTESTINAL RACT.** *(Pol.)* Ziemlanski, S. (Inst. Food Nutrit., Warsaw, oland), M. Wartanowicz, M. Dentyniecka and A. Szczygiel. *cta Physiol. Pol.* 19(2):181-190, 1968.

modification of the inverted loop technique of Crane and ilson (*J. Appl. Physiol.* 12:145, 1958) was used to study he absorption of folic acid from Krebs-Henseleit buffer by solated intestinal segments *in vitro* at 37C. Experiments in total of 170 Wistar rats varying in weight from 150 to 350 g howed that the site of maximal absorption of folic acid is he duodenum, with slightly less absorption in the proximal ejunum and still less in the cecum. There is very little folic cid absorption in the ileum or colon, even at a concentration radient of 100 mμg/ml. In the absence of a concentration radient (50 mμg/ml of folic acid on each side of the intestinal vall), there was no absorption in the cecum, indicating that bsorption in this segment is probably by passive diffusion only. n the duodenum and proximal jejunum, absorption continued n the absence of a concentration gradient, but was abolished y intraperitoneal injection of 2,4-dinitrophenol or KCN, ndicating that folic acid absorption in these segments is accomplished by active transport. The rate of absorption was lso found to decrease with age (i.e., with increasing body veight).

17 **FUNCTIONAL AND HISTOLOGICAL INJURY TO INTESTINAL MUCOSA PRODUCED BY HYPERTONICITY.** *(E.)* Kameda, H. (Johns Hopkins Hosp., Baltimore, Md.), T. Abei, S. Nasrallah and F. L. Iber. *Amer. J. Physiol.* 214(5):1090-1095, 1968.

In experiments on adult male Wistar rats, segments of proximal jejunum, distal ileum, and colon just distal to the cecum, 8-10 cm in length, were isolated with intact blood supply and used to study the absorption of glucose from isotonic saline solution and from solutions made hypertonic with mannitol, urea, polyethylene glycol or magnesium sulfate. In each case, the incubated material was removed from the isolated loop after 15 min and replaced with fresh solution for 6 consecutive periods. There was no absorption of glucose from the colon, although about 8% of the water was absorbed. In the small intestine, there was uniform absorption of glucose, water and sodium from isotonic saline over the 6 study periods, and no visible damage to the intestinal mucosa. When hypertonic solutions were placed in the intestinal segments, however, glucose absorption was impaired, resulting in a net increase in the glucose content of the lumen, and the intestinal mucosa showed superficial necrosis, especially at the tips of the villi. There was a direct correlation between the impairment or glucose absorption and the degree of histological damage. Furthermore, this damage persisted after replacement of the hypertonic solution by isotonic saline. Since the effect was the same in jejunum and ileum and independent of the particular compound used, it is concluded that hypertonicity *per se* injures both the glucose-absorbing mechanism and the intestinal mucosal barrier to glucose diffusion. Addition of mannitol with maintenance of isotonicity had no effect on glucose absorption or mucosal histology.

818 **LYMPHATIC AND VENOUS TRANSPORT OF WATER FROM RAT JEJUNUM: A VASCULAR PERFUSION STUDY.** *(E.)* Lee, J. S. (Dept. Physiol., U. Minnesota, Minneapolis) and K. M. Duncan. *Gastroenterology* 54(4):559-567, 1968.

A procedure was developed for perfusing the upper jejunum with heparinized homologous blood and demonstrating net water transport into the venous and lymphatic systems. In adult male rats, a jejunal segment 15-25 cm in length, the upper end beginning about 7 cm from the ligament of Treitz, was isolated with intract mesentery, rinsed with bicarbonate-Ringer solution containing glucose and saturated with 5% CO_2 in O_2, and transferred to a warm-oil chamber (38C) where it was perfused with fresh homologous blood via the mesenteric artery and portal vein (no recirculation). When bicarbonate-Ringer solution was placed in the lumen of the intestinal segment, net water absorption at a rate of 67-133 μliters/cm/hr could be demonstrated by a positive V-A difference (venous outflow rate greater than arterial inflow rate) and lymph flow. The rate of disappearance of water from the intestinal lumen was equalled by the sum of the V-A difference and the lymph flow, the proportion transported by the venous and lymphatic systems depending on the experimental conditions. In control studies, when a solution of unabsorbable $MgSO_4$ was placed in the lumen, there was no lymph flow and the V-A difference was either zero or negative. During absorption of bicarbonate-Ringer solution, the venous blood was found to have a low O_2 concentration and a pH of 7.17 (arterial pH = 7.41); glucose was transported from the lumen into the venous blood when glucose was provided, but blood glucose was utilized by the mucosa when glucose-free solutions were placed in the lumen. Changes in arterial pressure between 50 and 100 mm Hg had no significant effect on lymph flow. High venous pressures, however, increased lymph flow while reducing both total net water transport and the rate of water transport into the venous system. At very low venous pressures (0-5 mm Hg), lymph flow accounted for 10-25% of the net water transport, but at high venous pressures (above 20 mm Hg) net water transport was entirely by way of the lymphatic system.

819 **ACETYLSALICYLIC ACID AND IONIC FLUXES ACROSS THE GASTRIC MUCOSA OF MAN.** *(E.)* Overholt, B. F. (U. Hosp., U. Michigan, Ann Arbor) and H. M. Pollard. *Gastroenterology* 54(4):538-542, 1968.

The effects of a solution containing 100 mmoles of HCl plus 20 mmoles of acetylsalicylic acid per liter on the movement of hydrogen, sodium, potassium and chloride ions across the human gastric mucosa and on the volumes secreted by the stomach and emptied through the pylorus were compared with those of 100 mM HCl alone in 9 volunteers (7 men and 2 women, including 5 normal subjects and one patient each with atrophic gastritis, asymptomatic hypochlorhydria, duodenal ulcer, and antral gastritis). For control purposes, each solution also contained 25 μC per liter of $^{51}CrCl_3$ as a nonabsorbable marker. Irrigation of the stomach with 100 ml of the aspirin solution for three 15-min periods produced significant increases in gastric volumes and net movement of ions into the lumen, but no significant increase in gastric emptying compared to irrigation with HCl alone. There was no bleeding into the intestinal lumen. During irrigation with the aspirin solution, the mean basal secretion decreased to 0.80 mEq/15 min (1.32 during irrigation with HCl), the diffusion of Na^+, K^+ and Cl^- ions into the lumen increased to 6.01, 0.91 and 9.06 mEq/45 min, resp. (4.48, 0.59 and 6.57 during irrigation with HCl), and the volume "secreted" increased to 98.6 ml/45 min (67.3 during irrigation with HCl); an average of 1.44 mmoles of acetylsalicylic acid was absorbed during the 45-min period. The volume emptied through the pylorus averaged 95.3 ml/45 min during irrigation with aspirin and 82.3 ml/45 min during irrigation with HCl alone. Although the mean influx of H^+ ions was 1.80 mEq/45 min during irrigation with aspirin and 1.55 mEq/45 min during irrigation with HCl, this effect is not considered significant since in 3 patients on aspirin (2 of these also on HCl) there was a net movement of H^+ ions out of the stomach. Ion movement was not appreciably affected by either the amount of aspirin absorbed or by the presence of preexisting abnormal mucosal permeability. It is concluded that irrigation of the stomach with an aspirin-HCl solution increased the permeability of the gastric mucosa to ion movement, but failed to produce unequivocal evidence of chemical damage to the mucosa.

820 **INTESTINAL TRANSPORT OF 3-O-METHYL-D-GLUCOSE IN THE NORMAL AND ALLOXAN DIABETIC RAT. [ORAL COMMUNICATION; 40TH ANNUAL MEETING, CENTRAL SOC. CLIN. RES.]** *(E.)* Flores, P. (Iowa City, Iowa) and H. P. Schedl. *J. Lab. Clin. Med.* 70(5):865, 1967.

821 **ULTRASTRUCTURE FACTORS OF FAT ABSORPTION IN THE SMALL INTESTINE.** *(Rus.)* Yaremko, Ye. Ye. (L'vov Med. Inst., USSR). *Vop. Pitan.* 27(1):67-72, 1968.

822 **INTESTINAL ABSORPTION OF VITAMIN B_{12} IN EXPERIMENTAL STUDY.** *(Pol.)* Mastynska, M. (Poznan Med. Acad., Poland), J. Dzwonkowski and J. Woszczyk. *Pol. Tyg. Lek.* 23(15):537-538, 1968.

823 **ALDOSTERONE AND ANGIOTENSIN ACTION ON WATER ABSORPTION IN THE RAT JEJUNUM. [ORAL COMMUNICATION]** *(E.)* Crocker, A. D. (Dept. Physiol., U. Southampton, England) and K. A. Munday. *J. Physiol.* 192(3):36P-38P, 1967.

824 **STIMULATORY EFFECT OF GLYCURONAMIDE ON THE ABSORPTION OF ACETYLSALICYLIC ACID.** *(Fr.)* Constantin, M. (European Res. Cent. Mauvernay, Riom, France), J. Talvard, G. Beau and P. Duchêne-Marullaz. *Compt. Rend. Soc. Biol.* 161(7):1566-1569, 1967.

825 **THE SITE OF ABSORPTION OF VITAMIN B_{12} IN MAN.** *(E.)* McColl, I. (Guy's Hosp. Med. Sch., London, England). *Brit. J. Surg.* 54(10):841, 1967.

826 **THE 1- AND 2-OCTADECYL GLYCERYL ETHERS AS MODEL COMPOUNDS FOR STUDY OF TRIGLYCERIDE RESYNTHESIS IN CELL FRACTIONS OF INTESTINAL MUCOSA.** *(E.)* Gallo, L. (George Washington U. Sch. Med., Washington, D.C.), G. V. Vahouny and C. R. Treadwell. *Proc. Soc. Exp. Biol. Med.* 127(1):156-159, 1968.

827 **THE EFFECT OF AGE ON THE INTESTINAL PERSORPTION OF STARCH GRAINS.** *(Ger.)* Volkheimer, G. (1st Med. U. Clin., Charité Hosp., Berlin, Germany), F. H. Schulz, E. Hofer, B. Gromotka and H. Kressner. *Z. Alternsforsch.* 20(2):107-112, 1967.

828 **ABSORPTION OF VITAMIN B_{12} FROM THE HUMAN COLON.** *(E.)* Armstrong, B. K. (U. Western Aust., Perth). *Amer. J. Clin. Nut.* 21(4):298-299, 1968.

829 **COMPLEX OF INTRINSIC FACTOR AND B_{12} IN HUMAN ILEUM DURING VITAMIN B_{12} ABSORPTION.** *(E.)* Cooper, B. A. (McGill U. Clin. Montreal, Canada). *Amer. J. Physiol.* 214(4):832-835, 1968.

830 **STUDIES ON BLOOD FLOW DISTRIBUTION AND COUNTERCURRENT EXCHANGE IN THE SMALL INTESTINE.** *(E.)* Lundgren, O. (Dept. Physiol., U. Göteborg, Sweden). *Acta Physiol. Scand.* (Supp. 303):5-42, 1967.

SECRETION

831

HISTIDINE DECARBOXYLASE INHIBITION AND GASTRIC SECRETION. *(E.)*

Thayer, W. R., Jr. (Rhode Island Hosp., Providence) and H. F. Martin. *Amer. J. Dig. Dis.* 12(10):1050-1061, 1967.

In experiments on adult, male, albino CDF rats, measurements of gastric secretion by either the pylorus-ligation technique of Shay or an indwelling gastric cannula demonstrated that basal secretion was significantly lowered (from 97-114 to 27-46 μEq/hr) when histamine turnover had been blocked, either by feeding of a pyridoxine-deficient diet for periods of at least 3 months or by prior administration of 4-bromo-3-hydroxybenzyloxyamine dihydrogen phosphate (NSD-1055; 150-300 mg base/kg i.p.), which inhibits the enzyme histidine decarboxylase. This decrease in gastric secretion was ascribable mostly to a decrease in volume rather than to any decrease in total acidity. In pyridoxine-deficient or pretreated rats, the normal response to i.p. injection of gastrin (40 μg/kg of gastrin pentapeptide) was also blocked, but there was no effect on the response to histamine (10 mg/kg i.p.) or vagal stimulation; the latter was accomplished either indirectly via insulin hypoglycemia or directly by administration of the parasympathicomimetic drug bethanechol (10 mg/kg i.p.). These results suggest that histamine may be an important endogenous stimulator of gastric secretion, at least in the rat, that gastrin stimulates the parietal cell directly through histamine release, and that vagal stimulation apparently operates via some mechanism other than histamine release.

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EFFECT OF LONG-TERM TREATMENT WITH AN ANTICHOLINERGIC DRUG ON GASTRIC SECRETION IN RATS. *(E.)*

Kowalewski, K. (Surg. Med. Res. Inst., U. Alberta, Edmonton, Canada). *Amer. J. Dig. Dis.* 12(10):998-993, 1967.

In experiments on adult male Sprague-Dawley rats, prolonged administration of propantheline bromide (5 mg/kg i.m. twice daily for 3-12 months) was found to decrease both basal gastric secretion and the response to pyloric ligation or histamine infusion. Thus, in rats from which "pure juice" could be collected following ligation of both the pylorus and the cardia, the volume of gastric secretion was decreased from 6.9 to 2.9 ml after 3 months' treatment and to 0.8 ml after 12 months' treatment, while the percent of animals showing no free HCl increased from 25% at 3 months to 100% at 12 months. In rats subjected to pyloric ligation (Shay procedure), the volume had decreased from 14.0 to 10.0 ml and the free HCl had decreased from 57 to 24 mEq/liter after 6 months' treatment, while 50% of the rats failed to develop gastric lesions. In rats bearing chronic gastric fistulas and subjected to the 24-hr histamine test (10 mg/kg i.v.), the volume of secretion during histamine infusion had decreased from 29.0 to 18.0 ml and the free HCl had decreased from 113 to 65 mEq/liter after 6 months' treatment with propantheline bromide; however, these rats still showed a response to histamine compared to controls infused with saline. The decrease in gastric secretory activity is ascribed to the cumulative effect of repeated transitory gastric inhibition.

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CONCENTRATION AND PARTIAL CHARACTERIZATION OF HUMAN SALIVARY GASTRONE. *(E.)*

Baume, P. E. (Royal North Shore Hosp. of Sydney, Crows Nest, NSW, Australia), C. H. Baxter and A. Nicholls. *Amer. J. Dig. Dis.* 12(10):965-972, 1967.

When a lyophilized preparation of paraffin-stimulated mixed saliva obtained from normal subjects was subjected to phenol extraction, digestion with protease, heat precipitation and prolonged dialysis, the gastrone activity in the final PIPD (phenol-insoluble, protease-digested and dialyzed) extract was found to have been concentrated 30-fold as assayed on rats following ligation of the pylorus (Shay procedure). There was no significant gastric inhibitory activity in the phenol-soluble material, and Sephadex column chromatography indicated that the molecular weight of the active substance was over 100,000. One gram of whole saliva containing 83 gastrone U (median effective dose of saliva = 12 mg/kg) was found to yield 297 mg of PIPD extract with a total activity of more than 800 U (median effective dose of PIPD extract = 0.37 mg/kg), indicating that some of the activity in the initial lyophilized preparation was not measured by the test procedure. The final preparation contained 319 μg of carbohydrate, 9 μg of protein and 16 μg of sialic acid per mg, indicating a probable mucopolysaccharide nature. It is emphasized, however, that there may be no chemical relation between the gastric inhibitors isolated from the saliva and from other body fluids.

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THE ENZYME FORMING FUNCTION OF THE STOMACH ACCORDING TO PEPSINOGEN DETERMINATIONS IN THE GASTRIC MUCOSA, ON ITS SURFACE AND IN THE GASTRIC CONTENTS. *(Rus.)*

Kraevskii, E. V. (Leningrad Sanit.-Hyg. Med. Inst., USSR). *Ter. Arkh.* 40(2):34-38, 1968.

The results of aspiration biopsy, tests of gastric secretory function, and the pepsinogen concentrations at various levels in the gastric mucosa and in the gastric contents before and after stimulation were compared in 45 patients with peptic ulcer (33 duodenal and 12 gastric). Among 25 patients with either a normal gastric mucosa or superficial gastritis, gastric secretion was normal in 8, elevated in 12 and below normal in 5. Among 20 patients with chronic gastritis, with or without atrophy, the secretory function was normal in 6, elevated in 8 and below normal in 6. Biochemical studies showed that the pepsinogen content of the gastric mucosa and gastric contents was significantly increased in ulcer patients as a whole, but that the level in the gastric mucosa dropped sharply in the presence of chronic gastritis. Thus, the average pepsinogen content of the gastric mucosa was 110 mg/g among the first 25 ulcer patients (essentially normal mucosa), 70 mg/g in normal controls, and only 30 mg/g among the other 20 ulcer patients (chronic gastritis). In 5 patients with atrophic gastritis, moreover, there was also a significant drop in the pepsinogen content of the gastric contents.

835

EFFECT OF LIGATION OF PYLORUS OR COMBINED LIGATION OF PYLORUS AND CARDIA ON GASTRIC SECRETION OF NORMAL FASTING AND OF HISTAMINE-TREATED GUINEA PIGS. *(E.)*

Kowalewski, K. (Surg. Med. Res. Inst., I. Alberta, Edmonton, Canada). *Acta Gastroent. Belg.* 30(7):505-512, 1967.

In fasting male guinea pigs treated with promethazine (30 mg/kg, which prevents the systemic toxicity of histamine without affecting gastric secretion), ligation of the pylorus (Shay procedure) increased the volume of gastric secretion from 3.1 to 13.8 ml and the free HCl from 17.63 to 45.38 mEq/liter; ligation of both the pylorus and the cardia had less of an effect (10.5 ml and 31.38 mEq/liter). Treatment with histamine (30 mg/kg i.m. 15 min after promethazine) increased the volume of gastric secretion to 3.2 ml in nonoperated animals, 20.9 ml in those with pyloric ligation and 9.3 ml in those with pyloric and cardia ligation; the free HCl levels in these three groups were 29.92, 86.66 and 31.79 mEq/liter, resp. Histamine and ligation of the pylorus thus potentiated one another. Examination of the gastric mucosa in these animals (sacrificed 4 hr after injection of promethazine) revealed typical Shay ulcers only in guinea pigs receiving histamine, and in all of these regardless of surgery. It therefore still appears that such lesions in guinea pigs are primarily of vascular origin and are independent of the volume and acidity of the gastric juice.

836 **THE EXTERNAL SECRETION OF THE PANCREAS: A REVIEW OF PHYSIOLOGY, DIRECT AND INDIRECT TECHNIQUES OF EXPLORATION, AND PANCREATIC RADIOLOGY.** *(Fr.)* Plessier, J. (St. Antoine Hosp., Paris, France) and P. Economopoulos. *Rev. Prat.* 18(9bis):1423-1452, 1968.

This extensive review deals in considerable detail with the composition and function of the pancreatic juice, the hormonal and nervous control of pancreatic secretion, and the diagnostic techniques for evaluating disturbances in pancreatic function. Pancreatic juice has been shown to play a considerable role in the hydrolysis of polysaccharides, triglycerides, polypeptides and collagen. Under hormonal control of pancreatic secretion, the authors discuss the roles of secretin and pancreozymin from the small intestine in controlling the water-and-electrolyte and enzyme content of the pancreatic juice, resp., as well as the roles of gastrin and glucagon. It is pointed out that secretin also affects biliary and gastric secretion, and that the mechanism of action of pancreozymin is complicated by many secondary effects on the biliary tract, stomach, and intestinal motility. The nervous control of pancreatic secretion is accomplished via both the vagus and the splanchnic nerves, as a result of which the central nervous system also plays a role and complex interactions can be produced by anticholinergics, anesthetics, sympathicomimetics, nicotine, bradykinin, serotonin, hemodynamic changes and gastric hypothermia. The direct methods for studying pancreatic function involve the determination of bicarbonate and pancreatic enzymes in the duodenal fluid, either under basal conditions or after stimulation by a test meal or by injections or perfusion of secretin or pancreozymin; these methods are usually the simplest and most accurate. Enzymes which have been studied, and the function of each of which is briefly outlined, include pancreatic amylase, lipase, phospholipase A, trypsin, chymotrypsin, elastase, collagenase, ribonuclease, desoxyribonuclease, carboxypeptidase, and leucine aminopeptidase. Indirect methods for studying pancreatic insufficiency include the determination of nitrogen and total lipids in the feces, studies of carbohydrate metabolism or the absorption of labeled iron, vitamin B_{12} or triolein-oleic acid, studies of coagulation disorders which may be associated with pancreatitis, and the determination of serum lipids and transaminases or phosphorus and calcium. In this way, it is sometimes possible to differentiate between cancer of the pancreas, e.g., and acute or chronic pancreatitis or jejuno-ileal pathology. Finally, radiological and radioisotopic methods for exploring the pancreas are discussed and it is pointed out that parenchymal changes are rather difficult to visualize by simple radiography; as a result, various specialized techniques are also needed, including transverse axial stratigraphy, pancreatic arteriography or lymphography, surgical techniques, arteriography combined with the injection of agents such as erythrosin B, and scintillation scanning of the pancreas following injection of isotopes such as labeled selenomethionine. 17 refs.

837 **ISOFORMS OF PEPSIN IN THE GASTRIC JUICE OF NORMAL HUMAN SUBJECTS AND PATIENTS.** *(Rus.)* Parshin, A. N. (Inst. Oncol., Min. Health USSR, Leningrad), V. P. Kalinovskii and T. A. Goriukhina. *Vop. Med. Khim.* 14(1):71-73, 1968.

Chromatography of the dialyzed, centrifuged gastric juice from dogs, healthy human subjects, or patients with gastric ulcers, anacid gastritis or stomach cancer on DEAE-cellulose columns showed that normal gastric juice contains 3 isoforms of pepsin (Pepsin I, II and III) which differ in their proteolytic activity and ease of elution with NaCl in 0.1 M acetate buffer (pH 5.2). Pepsin I, however, accounts for by far the greatest part of the proteolytic activity, and is the only isoform which is significantly increased in the juice from ulcer patients. The gastric juice from patients with anacid gastritis contains only two isoforms (Pepsin I and III), and the activity of both is very low. Patients with cancer of the stomach seem to produce only Pepsin I, and this in small amounts, although saline extracts of tumor homogenates showed low activity of Pepsinogen I and II, and areas of gastric mucosa near the tumor showed normal amounts of all three isoforms of pepsinogen. The proteolytic activity in these experiments was measured against horse hemoglobin.

838 **PEPSIN AND GASTRICSIN DETERMINATION IN HUMAN GASTRIC JUICE.** *(Rus.)* Pokrovskii, A. A. (Inst. Nutrit., Acad. Med. Sci. USSR, Moscow) and L. M. Bogdanova. *Vop. Med. Khim.* 14(1):102-106, 1968.

Microelectrophoretic fractionation of human gastric juice on 0.5-cm thick starch blocks (in pH 5.0 acetate buffer for 3 hr in the cold at 25 milliamperes and 600-650 volts) revealed two distinct fractions with proteolytic activity: pepsin with an optimal pH of 2.0 and gastricsin with an optimal pH of 3.0. At low concentrations (with gastric juice diluted more than 100 fold), the rate of hydrolysis of casein was found to be proportional to the enzyme concentration; assuming that, under these conditions, the two enzymes act in an additive or parallel manner rather than in sequence, a method was developed for calculating the activity of each enzyme at its optimal pH in a single sample of gastric juice. If the total enzymatic activity at pH 2 is symbolized by A_2 and the total activity at pH 3 is A_3, then the pepsin activity at pH 2 is given by $3.65\ (A_2 - 0.90A_3)$, and the gastricsin activity at pH 3 is given by $2.94\ (1.24A_3 - A_2)$. Control studies showed that the results of the microelectrophoretic method agreed with those of the usual technique. A study of gastric enzyme secretion in response to a stimulus, using the microelectrophoretic method, showed that the pepsin/gastricsin ratio is constantly changing with time.

Gastricsin is apparently secreted first, so that the proteolytic activity 30 min after a stimulus is due almost entirely to gastricsin, but then the ratio is rapidly reversed and the pepsin activity is generally significantly greater than that of gastricsin.

839 EFFECT OF INTEROCEPTIVE STIMULATION ON THE FUNCTION OF THE BILE-SECRETING SYSTEM.

(Rus.) Klimov, P. K. (I. P. Pavlov Inst. Physiol., Acad. Sci. USSR, Leningrad). *Fiziol. Zh. SSSR Sechenov* 54(2):245-251, 1968.

Biliary cholangiography carried out under various conditions in 8 dogs, two of which had gastric fistulae, showed that the biliary tract is extremely sensitive to reflex stimuli from the walls of the stomach and rectum. Such interoceptive stimuli were found to affect the secretion of bile from the liver into the bile ducts in both fed and fasted animals, as well as disrupting the reflex response of the biliary tract to the intake of food and delaying the neurohumoral phase of gallbladder contraction. The principal effects of gastric or rectal distension (by means of rubber balloons filled with air or water at varying pressures) were changes in the volume and tone of the gallbladder and sphincter of Oddi, spasm of the terminal segment of the common bile duct, and a reduction in the rate of biliary secretion. Evacuation of the gallbladder after ingestion of egg yolk was delayed by gastrointestinal reflexes. However, the effects of interoceptive reflexes were much more pronounced if cold water (10C) was used to fill the balloons than if warm water (40C) was used. The effects of gastric and rectal distension could be abolished by injection of atropine (2 mg s.c.). Irrigation of the stomach with HCl, on the other hand, stimulated biliary secretion and produced contraction of the gallbladder, resulting in the discharge of bile into the intestine.

840 EFFECT OF ADRENALECTOMY ON HISTAMINE-INDUCED SECRETION OF GASTRIC JUICE IN RATS.

(Rus.) Gazhala, E. M. (I. M. Sechenov Inst. Evol. Physiol. Biochem., Acad. Sci. USSR, Leningrad) and Zh. G. Kassil. *Fiziol. Zh. SSSR Sechenov* 54(2):240-244, 1968.

The secretory response to histamine (1 mg) and the morphology of the gastric mucosa were investigated in a total of 95 adult female rats in which the esophagus and pylorus had been ligated to collect the gastric juice while excluding the saliva (technique of Shay as modified by Kim and Shore). In rats which had been adrenalectomized 10 days before, the volume of secretion averaged only 0.39 ml compared to 0.6 ml in controls, and the gastric acidity averaged only 0.09 g% free HCl compared to 0.20 in controls. Histological examination revealed scattered areas of degeneration in the secretory epithelium of the adrenalectomized animals, characterized mainly by wrinkling, nuclear pyknosis and cytoplasmic degranulation in the chief cells and cells of the lining. There were no significant morphological changes in the accessory cells or the cells of the superficial epithelium.

841 SIGNIFICANCE OF THE NERVOUS CONNECTIONS OF THE STOMACH AND INTESTINE IN THEIR SECRETORY REACTIONS TO EMOTIONAL STRESS.

(Rus.) Maevskaia, N. V. (A. M. Gor'kii Med. Inst. Donetsk, USSR). *Fiziol. Zh. SSSR Sechenov* 54(2):232-239, 1968.

In experiments on a total of 15 dogs, including 10 with an isolated gastric pouch (5 by the method of Pavlov and 5 that of Heidenhain) and 5 with a segment of jejunum isolated by the method of Tiri, aggressive responses induced by the presentation of a cat and lasting 10, 30 or 60 min were found to inhibit histamine-induced gastric secretion about 48%. This inhibitory effect was essentially identical in Pavlov and Heidenhain pouches and was unaffected by denervation, subdiaphragmatic vagotomy or ganglionic blockade (hexonium, 6-7 mg/kg s.c.). Denervation of the transplanted stomach also did not prevent the development of hypersecretion in the days following prolonged excitation. On the other hand, secretion in a jejunal segment isolated by the method of Tiri (with maximal innervation via the serosal-muscular bridge but lacking specific innervation due to section of the mesentery) was increased during a 60-min aggressive response. These results indicate that humoral factors play a leading role in the effect of emotional excitation on gastrointestinal secretion.

842 THE EFFECT OF VAGAL BLOCK OR HEXAMETHONIUM ON GASTRIC SECRETION IN THE DOG.

(E.) Limbosch, J. M. (U. Washington Sch. Med., Seattle), J. H. Wyllie and L. M. Nyhus. *Scand. J. Gastroent.* 3(1):7-17, 1968.

The effects of vagal nerve anesthesia (2.5 ml of 2% xylocaine, and ganglion-blocking (1 mg/kg of hexamethonium chloride) on the stimulation of gastric acid and pepsin secretion by 2-deoxy-D-glucose, gastrin, and histamine were studied in 4 Heidenhain and 4 Pavlov pouch dogs. Xylocaine and hexamethonium blocked the stimulation of acid and pepsin by 2-deoxy-D-glucose; blocking was less effective against gastrin and still less effective against histamine stimulation. It is advocated that "medical vagotomy," using a combination of hexamethonium and atropine, be employed in conjunction with gastrin (rather than histamine) stimulation in clinical studies to predict the effect of surgical vagotomy.

843 EFFECT OF OESOPHAGEAL PERFUSION WITH ACID ON BASAL GASTRIC SECRETION.

(E.) Giles, G. R. (Dept. Surg., U. Leeds, England), C. G. Clark and R. Buchan. *Gut* 9(1):52-56, 1968.

Experiments in 12 normal subjects (9 men and 3 women, 21-34 yr old), 8 patients with duodenal ulcer (6 men and 2 women, 28-56 yr old), and 16 patients with hiatus hernia (9 men and 7 women, 41-64 yr old) showed that, in contrast to the effect of acid in the duodenum, the presence of acid in the esophagus not only fails to inhibit gastric secretion but stimulates it, particularly in patients with duodenal ulcer or hiatus hernia and esophagitis. In control studies, perfusion of the esophagus with tap water had little effect on gastric secretion, while perfusion with 0.1 N or 0.01 N HCl increased both the volume and the acidity of the gastric juice in normal subjects. Among 8 patients with duodenal ulcer, one showed no change on esophageal perfusion with acid but 7 showed increases in both volume (from 109 to 198.6 ml/hr) and acidity (from 6.0 to 10.4 mEq/hr). Among the patients with hiatus hernia, 7 were asymptomatic and, although the volume of gastric secretion increased in 6 of 7, gastric acidity increased on esophageal perfusion in only one case. Among 9 patients with esophagitis due to hiatus hernia, however, 8 showed marked increases in both volume and acidity when the esophagus was perfused with dilute acid.

844 **EFFECT OF INTRAVENOUS IRON THERAPY ON GASTRIC ACID SECRETION IN IRON-DEFICIENCY ANAEMIA.** *(E.)* Desai, H. G. (Tata Mem. Hosp., Bombay, India), B. C. Mehta, A. V. Borkar and K. N. Jeejeebhoy. *Gut* 9(1):91-95, 1968.

The results of the maximal histamine test in 36 patients (21 men and 15 women, 16-60 yr old) with severe iron-deficiency anemia (hemoglobin less than 7 g%) showed that intravenous iron therapy (Fe-dextran or Imferon, 1.5-2.5 g by slow i.v. infusion in 4-6 hr) had no immediate effect on either the average gastric acidity or the average volume of gastric secretion (160 ml compared to 250 ml in healthy controls). Although there was no significant change in patients over the age of 30 or having basal gastric secretion values less than 5 or more than 15 mEq/hr, there was a probably significant increase in gastric acid output following Fe therapy in patients below the age of 30 or whose basal secretion was between 5-15 mEq/hr. It is therefore felt that deficiency of an iron-containing enzyme system probably plays some role in the reduction in acid output in iron deficiency anemia; the lack of response in some patients is ascribed to severe gastric mucosal atrophy. In 3 of 6 patients tested, there was a significant increase in acid output after the hemoglobin levels had returned to normal. Gastric biopsy in 10 patients revealed a normal mucosa in 4, infiltration of the stroma with lymphocytes and plasma cells in 3, chronic superficial gastritis in one, and atrophic gastritis in two cases.

845 **GASTRIC SECRETORY RESPONSE TO IRON THERAPY.** *(E.)* Stone, W. D. (Dudley Rd. Hosp., Birmingham, England). *Gut* 9(1):99-105, 1968.

The results of the maximal histamine test and other laboratory determinations were compared before and after iron therapy (large doses of parenteral and oral iron plus, in some cases, i.v. infusion of iron-dextran) in 21 patients (11 men and 10 women, 17-69 yr old) with iron deficiency anemia (hemoglobin of 4.9-11.3 g%, serum Fe of 10-67 μg%). At the time of the second series of gastric function tests, 1.5-11 months after the first, the hemoglobin was 10.5-16.8 g% and the serum Fe was 9-168 μg%, 7 of the 21 still having values below 50 μg%. The maximal acid secretion had increased from an average of 9.4 (range 0-29.8) to 12.0 (range 0-35.4) mEq/hr. However, significant increases in acid output were observed in only 9 patients, including 8 with increases of over 2 mEq/hr from basal levels of 3.1-29.8 mEq/hr and one achlorhydric patient who now produced 1.8 mEq/hr; the 12 patients in whom there was no significant change in acid output included 3 with achlorhydria, 6 with severe hyposecretion and 3 normals. A study of pepsin secretion during histamine stimulation showed less consistent results, with significant increases in 5 of 9 and 1 of 12, respectively; the average in the entire group was increased from 1737 to 3485 Hunt units/hr. Vitamin B_{12} absorption (as measured by hepatic uptake of labeled vitamin) was increased in 5 of 6 patients showing increases in acid secretion and in 7 of 11 patients in whom the acid output was not increased. The serum B_{12} level, however, was increased only in two patients with parietal cell antibodies and very low initial serum B_{12} levels (increases from 93 to 176 and from 171 to 330 μμg/ml). The average age of the responsive patients was only 36.3 yr compared to 46.8 yr for the 12 nonresponders. The responsive patients also showed higher serum iron levels, a greater saturation of the iron-binding capacity, a better initial secretory function (average 12.8 mEq/hr compared to 6.9 in the nonresponsive group), and less atrophic gastritis (3 of 9 compared to 6 of 12); the only 3 patients with parietal-cell antibodies were all in the nonresponsive group. It is concluded that improvement in gastric acid secretion following iron therapy is more common in younger patients with less impairment of secretion and less severe gastritis.

846 **COMPARATIVE EFFECTS OF TETRAGASTRIN AND HISTAMINE ON PEPSIN SECRETION IN MAN.** *(E.)* Koster, K. H. (Bispebjerg Hosp., Copenhagen, Denmark), V. Faber and P. Rodbro. *Scand. J. Gastroent.* 3(1):106-109, 1968.

Tetragastrin (20 μg/kg)- and histamine (40 μg/kg)-stimulated pepsin secretion were observed in 9 male duodenal ulcer patients. The pepsin output stimulated by histamine was higher than that stimulated by tetragastrin. A dose-response curve is necessary to establish the dose of tetragastrin capable of maximally stimulating pepsin output.

847 **THE EFFECT OF ATROPINE ON GASTRIC SECRETION IN THE DOG.** *(E.)* Wyllie, J. H. (U. Washington Sch. Med., Seattle), J. M. Limbosch and L. M. Nyhus. *Scand. J. Gastroent.* 3(1):18-22, 1968.

The effects of atropine sulfate (0.1 mg/kg i.v.) on gastric acid and pepsin secretion stimulated by gastrin (0.5-6 μg/kg/hr), histamine (100 and 800 μg/hr), and a gastrin-like synthetic pentpeptide (0.5-1.0 μg/kg/hr) infusion were studied in 4 Heidenhain and 4 Pavlov pouch dogs. Only gastrin-stimulated acid secretion was inhibited; neither the stimulant dose nor the secretion level had much bearing on the result. There was no significant difference between histamine- and gastrin-stimulated pepsin secretion before or after giving atropine, although later the resting secretion level was significantly lower with gastrin infusion. The synthetic pentapeptide responses were similar to those of porcine gastrin. The results suggest that gastrin stimulates gastric secretion indirectly by exciting neurons in the intraluminal plexus.

848 **FURTHER STUDIES ON *EX VIVO* ISOLATED PERFUSED CANINE STOMACH: ROLE OF ANTRUM AS AN INHIBITOR OF GASTRIC SECRETORY FUNCTION.** *(E.)* Dritsas, K. G. (Surg.-Med. Res. Inst., U. Alberta, Edmonton, Canada) and K. Kowalewski. *Scand. J. Gastroent.* 3(1):99-105, 1968.

Parabiotic studies on 10 pairs of mongrel dogs (18-25 kg) were conducted to determine the effects of innervated and denervated antrum acidification *in vivo* and *ex vivo* on histamine-stimulated gastric secretion; antrum and fundus were surgically separated by a mucosal diaphragm. Antrum acidification did not inhibit secretion in either intact or denervated stomachs. This observation lends credence to the hypothesized duodenal inhibitory mechanism dependent upon neural integrity between the stomach and duodenum.

49 RELATIONSHIP BETWEEN DUODENAL pH AND PANCREATIC SECRETION IN DOGS AND IGS. *(E.)* Hong, S. S. (Dept. Pharmacol., U. Washington, eattle), M. Nakamura and D. F. Magee. *Ann. Surg.* 166(5): 78-782, 1967.

he effects of induced changes of duodenal pH upon pan-reatic secretion was studied in 7 dogs with Thiry Vella loops f duodenum and pancreatic fistulae and in 14 pigs with pan-reatic fistulae, duodenal fistulae and low gastroenterostomies. n both species the volume of pancreatic juice secreted varied irectly as the [H+] of solutions introduced into the duodenum. lkaline solutions in pigs depressed spontaneous and secretin-timulated secretion. Pancreatic juice produced more profound nd prolonged depression of secretion.

50 ACTION OF ANTIDIURETIC HORMONE ON FOOD-STIMULATED GASTRIC SECRETION. *E.)* Schapiro, H. (Sch. Basic Med. Sci., U. Tennessee Med. nits, Memphis), E. H. Storer and L. G. Britt. *Amer. Surg.* 4(4):315-316, 1968.

he action of antidiuretic hormone on gastric secretion was tudied in 5 conscious dogs with previously prepared Heidenhain ouches. Dogs were fed 200 or 400 g of meat and gastric juice ollections were analyzed every 15 min before and after i.v. dministration of antidiuretic hormone (Pitressin; 10, 20, 30, nd 50 mU/kg). Volumes of gastric secretion were reduced n a dose-related manner after administration of antidiuretic ormone. Oxytocin had no effect in doses up to 100 mU/kg. uring antidiuretic hormone inhibition, the acid concentration nd the pepsin remained constant.

51 EFFECT OF SODIUM TAUROLITHOCHOLATE ON BILE FLOW AND BILE ACID EXCRETION. *E.)* Javitt, N. B. (Cornell U. Med. Coll., New York City) and . Emerman. *J. Clin. Invest.* 47(5):1002-1014, 1968.

n male hamsters and male and female Wistar rats bearing ndwelling biliary catheters, intravenous infusion of ^{14}C-labeled sodium taurolithocholate at rates of 0.03-0.06 μmoles/min produced rapid cholestasis with decreases in both biliary flow and bile acid excretion. As shown by liquid scintillation spectrometry, sodium taurolithocholate was rapidly excreted in the bile in concentrations greater than its aqueous solubility. Excretion was enhanced, and the cholestatic effect was abolished, by simultaneous infusion of sodium taurocholate or sodium taurochenodeoxycholate at rates of 0.12-2.4 μmoles/min. Cholestasis occurred whenever the molar amount of administered sodium taurolithocholate was greater than the combined endogenous excretion and infusion rate of primary bile salt, but was consistently reversible on cessation of taurolithocholate infusion or infusion of additional primary bile salt. Infusion of sodium taurocholenate, a relatively insoluble (2.7 μmoles/ml at 37C) nonhemolytic bile salt, at rates of 0.6 μmoles/min produced a cholestatic effect which was qualitatively similar to that of sodium taurolithocholate (which hemolyzes washed human erythrocytes *in vitro*). Since there was no increase in mannitol concentration in the bile during cholestasis in animals receiving i.v. mannitol after ligation of the renal pedicles, the reduction in bile flow is probably not due to reabsorption of water from the biliary tree. The cholestatic effect of sodium taurolithocholate and taurocholenate is ascribed to their physical properties, specifically to possible obstruction of segments of the biliary tree by precipitates of the poorly soluble salts, or to a decrease in the entry of water into the biliary tree.

852 HISTAMINE IN THE PLASMA AND GASTRIC JUICE OF CATS DURING INFUSIONS OF [^{14}C] HISTAMINE. *(E.)* Born, G. V. R. (Roy. Coll. Surg., Lincoln's Inn Fields, London, England) and K. F. Sewing. *J. Physiol.* 193(2):397-403, 1967.

In chloralose-anesthetized cats with gastric fistulae, receiving labeled histamine i.v. at rates of 18 nmoles/min for the first hour, 36 nmoles/min for the second hour and 72 nmoles/min for the third hour, the rate of gastric secretion also increased but at each rate of infusion the secretion rate became fairly constant. The histamine concentration in the gastric juice remained fairly constant during the entire experiment, amounting to about 33% of that in the plasma. Initially, however, the histamine concentration in the juice was higher than could be accounted for by the radioactivity, indicating washing out of endogenous histamine, while later in the experiment the radioactivity of the juice increased more sharply, indicating the presence of histamine metabolites. When labeled histamine was infused at a constant rate of 36 nmoles/min for the 3-hr period, the rate of gastric secretion remained constant while the histamine concentration decreased gradually in both the plasma and the gastric juice. There was no quantitative relation between the amount of histamine infused and the amount appearing in the gastric juice, nor between the rate of gastric secretion and the concentration of histamine in the plasma or gastric juice. It is concluded that the secretion of histamine into the gastric juice is an incidental phenomenon, due to simple diffusion, and is not a prerequisite to gastric secretion.

853 STIMULATION OF ACID SECRETION IN MINIATURE PIGS BY HISTALOG AND ICI-50.123. *(Fr.)* Lambert, R. (Edouard Herriot Hosp., Lyon, France), A. Decultieux, C. Andre and F. Martin. *C.R. Soc. Biol. (Paris)* 161(8/9):1712-1715, 1967.

854 THE SOURCE OF A GASTRIC SECRETORY INHIBITION FROM HUMAN SALIVA. *(E.)* Baume, P. E. (Royal North Shore Hosp., Sidney, Australia), C. H. Baxter and A. Nicholls. *Aust. Ann. Med.* 17(1):42-48, 1968.

855 THE EFFECT OF VAGOTOMY ON GLUCOSE TOLERANCE. *(E.)* Nelson, N. C. (Louisiana State U. Med. Ctr., New Orleans), D. R. Guzzetta, J. L. Kinder and J. L. Cocchiara. *Amer. Surg.* 34(1):26-30, 1968.

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SECRETION

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874 **THE RELATIONSHIP OF "BUFFERING CAPACITY" OF FOOD TO CANINE GASTRIC ACID SECRETION. [ORAL COMMUNICATION; SURG. RES. SOC., ABERDEEN, JULY 14-15, 1967.]** *(E.)* Williams, C. B. (Royal Infirm., Cardiff, Wales) and A. P. M. Forrest. *Brit. J. Surg.* 55(1):71, 1968.

875 **EFFECT OF DILUTE SODIUM BICARBONATE (GRAND GRILLE VICHY WATER) ON PANCREATIC AND BILIARY SECRETION IN THE RAT (COMPARISON BETWEEN THE DUODENAL AND INTRAVENOUS ROUTES). [ORAL COMMUNICATION; FRENCH SOC. MED. HYDROL. CLIMATOL., MARCH 18-19, 1967.]** *(Fr.)* Debray, C., J. de la Tour, C. Vaille, C. Roze and M. Souchard. *Presse Med.* 75(48):2477, 1967.

876 **EFFECT OF RESPIRATORY CONDITIONS ON THE GASTRIC pH IN SITU.** *(Fr.)* Guerrin, F. (Fac. Med. Pharm., Lille, France), H. Robin, P. Boulanger, C. Voisin, K. Mandai and J. P. Latreille. *Lille Med.* 13(2):176-185, 1968.

877 **THE MAXIMAL PANCREATIC SECRETION IN DOGS.** *(E.)* Henriksen, F. W. (U. Copenhagen, Denmark). *Scand. J. Gastroent.* 3(2):140-144, 1968.

See also abstract nos.: 878,1314,1316,1647,1648

DIGESTION

78 **EFFECT OF PATTERNS OF EATING AND ANTACIDS ON FAECAL UROBILINOGEN EXCRETION.** *(E.)* Malhotra, S. L. (Med. Dept., Southeast Railway, Calcutta, India). *Gut* 9(1):38-41, 1968.

Studies on 12 ambulatory patients with diseases not related to the digestive tract who were not receiving any medication showed that the fecal urobilinogen (both the concentration and the amount excreted in 24 hr) is increased when patients are switched from a wheat diet requiring mastication to a rice diet which can be swallowed without chewing. The fecal urobilinogen concentration increased on the nonmasticatory rice diet in all 12 cases, from an average of 26.48 to 86.98 mg per 100 g feces. In 8 of the 12, however, the fecal urobilinogen decreased again if the rice diet was deliberately chewed. Although addition of HCl (100 ml of 0.15 N acid three times a day, after meals) had no effect, addition of antacids (100 ml of 5% $NaHCO_3$ + 2 teaspoonsful of Aludrix, three times a day after meals) decreased the fecal urobilinogen in 9 of 12 cases (to 62.46 mg per 100 g feces) while on the rice diet. Antacids had no effect on fecal urobilinogen when the patients were on the wheat diet. It is concluded that the saliva secreted during chewing produces these differences by preventing stimulation of the gallbladder either through its acid-neutralizing properties or through its mucus content.

879 **PRODUCTS IN THE INITIAL STAGES OF DIGESTION OF POLYDEOXYNUCLEOTIDES BY PANCREATIC DEOXYRIBONUCLEASE (DNase I).** *(E.)* Hoard, D. E. (Los Alamos Scientific Lab., New Mexico) and W. Goad. *J. Molec. Biol.* 31(3):595-606, 1968.

Enzymatically-synthesized single strand polydeoxynucleotides with short isotopically labeled end segments were partially digested by pancreatic DNase (DNase I). Ultraviolet-absorbing material remains as oligonucleotide fragments greater than 10 nucleotide residues in length. The hydrolysis rates were proportional to the chain lengths. It is assumed that long homodeoxynucleotides containing many diester linkages will be attacked at random; mathematical methods treating a wide class of models were developed.

880 **ACTION OF PEPSIN AND PAPAINE ON A MUCOPOLYSACCHARIDE SULFATE OF GASTRIC ORIGIN.** *(Fr.)* Martin, F. (Edouard Herriot Hosp., Lyon, France), R. Lambert, A. Berard and M. Martin. *C.R. Soc. Biol. (Paris)* 161(8/9):1727-1730, 1967.

See also abstract no.: 1486

MOTILITY

881 **THE EFFECT OF CODEINE ON THE PERISTALTIC REFLEX OF THE ISOLATED GUINEA-PIG ILEUM.** *(E.)* Beleslin, B. B. (Inst. Path. Physiol., Fac. Med., Belgrade, Yugoslavia), D. B. Beleslin, S. B. Bogdanović and M. M. Rakić. *Acta Med. Iugosl.* 21(1):1-12, 1967.

In order to investigate the mechanism of action of codeine in the isolated guinea-pig ileum, the effect of acetylcholine, nicotine, angiotensin, physostigmine, neostigmine and two anticholinesterases were studied; all drugs were allowed to act on the serosal side of the ileum. The peristaltic reflex, elicited by increasing the intraluminal pressure to a constant height, was blocked by codeine at a concentration of 1×10^{-5} g/ml and inhibited at concentrations from 2.5×10^{-5} to 1×10^{-4} g/ml. When the peristaltic reflex was blocked by codeine, the addition of acetylcholine or nicotine produced regular and full peristaltic waves. Angiotensin immediately restored the codeine-blocked reflex, while a latent period lasting 1 to 10 min was seen before the reflex was restored by the dimethobromide of 1:5-di(-p-N-allyl-methylaminophenyl)-penta-3-one (BW-284-C-51), N-p-chlorophenyl-N-methylcarbamate of m-hydroxyphenyltrimethylammonium bromide (Ro-20-1250), or the dimethylcarbamate of (2-hydroxy-5-phenylbenzyl)-trimethylammonium bromide (Ro-2-0683). Physostigmine and neostigmine both restored the reflex after a latent period of 2-5 min. It is suggested that the mechanism of the codeine block could be due to increased destruction, diminished formation or a decreased release of acetylcholine as well as some kind of competitive inhibition. It was noted that codeine could have produced depression or inhibition of the peristaltic reflex by action on the "regulator" and "acceptor" ganglion cells, by inhibition of neuromuscular transmission or possibly by a direct paralyzing action on the smooth muscle.

882 **EVALUATION OF THE EFFECT OF THE β-DIMETHYLAMINOETHYL ESTER OF α,α-DIPHENYL-α-PROPARGOXYACETIC ACID ON THE MYOCONTRACTILE ACTIVITY OF VARIOUS SPASMOGENIC AGENTS.** *(It.)* Torrielli, M. V. (Inst. Pharmacol., U. Perugia, Italy). *Ann. Med. Perugia* 58(3):523-528, 1967.

Studies on isolated preparations of stomach, colon and uterus from adult Wistar rats and on isolated guinea pig ileum demonstrated that β-dimethylaminoethyl α,α-diphenyl-α-propargoxyacetate (EDPA) has no significant effect *per se* on smooth muscle tone or motility. It also has only about 0.7-1.03% of the anticholinergic activity of atropine, as measured by ability to counteract the effects of acetylcholine on the isolated stomach or colon, weak anti-serotonin activity on the isolated rat uterus, and about 1.14% of the antihistaminic activity of promethazine as measured on the guinea pig ileum. In tests against the spasms produced by $BaCl_2$, however, the mean effective concentration of EDPA was only 1.55 μg/ml, compared to 3.50 μg/ml for papaverine. It is concluded that EDPA is an effective myolytic drug with more than twice the activity of papaverine on the guinea pig ileum.

883 **HORMONAL CONTROL OF INTESTINAL MOTILITY.** *(E.)* Hiatt, R. B. (Coll. Phys. Surg., Columbia U., New York City), I. Goodman and A. Alavi. *Ann. Surg.* 166(4):704-711, 1967.

Constant intestinal excitation was maintained by balloon pressure in Thiry-Vella-prepared dogs to study posterior pituitary hormone effects on intestinal motility. Commercially-prepared pituitary hormone preparations (pitressin, pituitrin, and lysine and arginine vasopressin) and crude bovine posterior pituitary extracts were bioassayed; the crude extracts were subjected to cellulose and sephadex column fractionation. One protein fraction [not named] isolated from the bovine preparation was found to be a potent motility inhibitor. Pitressin was the most potent inhibitor used in human studies; its ability, at hormonal levels, to integrate deranged intestinal motility and to enhance fluid absorption in patients with various intestinal arrhythmias has been documented. It is suggested that the posterior pituitary's role in intestinal motility and absorption is important; further studies are needed to identify the protein fraction mentioned above and its role in motility control.

884 **ELECTRICAL ACTIVITY OF STRIATED AND SMOOTH MUSCLE OF THE ESOPHAGUS.** *(E.)* Hellemans, J. (St. Rafael Acad. Hosp., Louvain, Belgium), G. Vantrappen, P. Valembois, J. Janssens and J. Vandenbroucke. *Amer. J. Dig. Dis.* 13(4):320-334, 1968.

Electromyographic studies were carried out *in vivo* on the striated-muscle esophagus of dogs and on the lower half of the cat and monkey esophagus, which is composed mostly of smooth muscle. For this purpose, 1-4 bipolar platinum electrodes were implanted in the esophageal wall of 13 dogs, 2 cats, and 8 monkeys at levels ranging from the infradiaphragmatic portion of the gastroesophageal sphincter to the supradiaphragmatic portion of this sphincter and the lower segment of the esophagus up to 10 cm above the diaphragm; recordings were then made both at rest and during swallowing. Spike activity was usually absent in the resting gastroesophageal sphincter, as well as in the esophagus proper, although spikes of low amplitude were observed occasionally in the striated esophageal musculature of monkeys and dogs. In these striated muscles, swallowing resulted in a burst of spikes, which progressed downward and soon reached a maximum rate that was constant for any one level in the esophagus. This activity closely resembles the electromyographic recording of a skeletal muscle contraction of progressively increasing and decreasing strength. In the smooth-muscle portion of the monkey or cat esophagus, the response to swallowing was quite different, being characterized by a smaller number of spikes, with a longer duration and higher amplitude. There was no gradual increase and decrease in amplitude and number, as was observed in the striated-muscle portion. Transition between striated and smooth muscle has been found to occur at a higher level in the inner circular layer of the esophagus than in the outer longitudinal muscle coat, and recordings from the transition zone reflect a complex interaction between these different activities. There was no specific response to swallowing in the infradiaphragmatic portion of the gastroesophageal sphincter, while in the supradiaphragmatic portion the response resembled that in the esophagus proper, with a lower amplitude and lower rate of firing. Relaxation of the sphincter was not accompanied by any recognizable electrical changes. Swallowing was also found to inhibit both the primary and secondary peristaltic contraction in both the striated and smooth-muscle portions of the esophagus and gastroesophageal sphincter. This inhibition of sphincteric contraction resulting from dis-ention of the esophagus may be related in some way to the relaxation of the gastroesophageal sphincter.

885 **THE ELECTRICAL ACTIVITY OF THE ALIMENTARY TRACT.** *(E.)* Daniel, E. E. Dept. Pharmacol., U. Alberta, Edmonton, Canada). *Amer. J. Dig. Dis.* 13(4):297-319, 1968.

This detailed review of small intestine electrical activity and ts possible relation to intestinal function (i.e., motility) begins with a discussion of 6 major unsolved problems of ntestinal structure which drastically limit the precision and number of answers available to questions about the functional nterrelations by which individual cells influence the electrical activity of other cells and groups of cells. These structural problems are: (1) the synaptic relations between post-ganglionic sympathetic nerves and intestinal elements; (2) the synaptic relations between parasympathetic intrinsic nerves and smooth muscles; (3) effective stimuli for and the role of chemicals in the excitability of the receptors initiating the peristaltic reflex; (4) synaptic relations and the transmittal of activity between the sensory nerves for peristaltic reflex activity and the parasympathetic intrinsic nerves; (5) nervous structures mediating "nonadrenergic" inhibition on transmural stimulation and their interconnections; and (6) structural and functional interconnections between smooth muscle cells, both within and between muscle layers. The author compares the various types of electrodes (micro-, pressure, pore, wick, and needle or punctate) used for recording intestinal activity, and then discusses some of the characteristic features of the periodic and spike potentials recorded from the small intestine of man, dogs, cats, rats, and other species. Particular attention is given to the oscillatory slow waves which propagate in both directions along the small intestine. Two possible explanations are offered for the problem of how the flow of positive current through the volume conductor and into the negative sink in the muscle under the electrode could lead to a positive potential deflection at the electrode during depolarization. Attention is also given to the ionic conductance changes underlying intestinal slow waves and to the possible role of intrinsic intestinal nerves. The effects of procedures designed to destroy such nerves are complex and lead to several relatively unsatisfactory explanations of the relation between nerves and slow-wave propagation: (1) the intestinal intrinsic nerves or some component required for the propagation of slow waves may determine their inherent frequency and amplitude and diminish segmental and other movements by the effect on the slow waves; (2) the production of a mediator by the intrinsic intestinal nerves may be essential for intestinal function; or (3) some other nonnervous structure or function of the intestine may be involved. It is concluded that the mechanism underlying the interaction between intestinal muscle cells, nerve cells, muscle layers, etc., is not yet understood, and that the activities of cells grouped in arrays cannot be deduced from the activities of component cells in isolation. It seems likely, although proof is lacking, that most interactions between muscle cells are electrical, although chemical interactions are probable between nerve and muscle. The existence or nature of any interaction between slow waves in muscle and nerves or other structures susceptible to anoxia remains unknown, as do the details of how slow waves exert control over muscle excitability to bring about the complex motility patterns of the functioning intestine. (69 refs.)

886 **CONTROL OF GASTRIC EMPTYING.** *(E.)* Hunt, J. N. (Guy's Hosp. Med. Sch., London, England) and M. T. Knox. *Amer. J. Dig. Dis.* 13(4):372-375, 1968.

In a brief review of the physiology of gastric emptying, it is pointed out that the fundus acts as a reservoir and the antrum as a metering pump, the rate of transfer of food from stomach to duodenum being exponential in form with about 1-3% of the gastric contents being emptied per minute. Since the absorptive capacity of the small intestine is large, the regulation of gastric emptying also determines the rate at which materials enter the blood stream. Transfer of gastric contents to the duodenum consistently takes place about 3 times per minute, so that regulation of gastric emptying depends on changes in the volume pumped per stroke and probably on the timing of pyloric closure during antral systole. The normal inhibition of gastric emptying is accounted for by receptors in the duodenal lumen. The remainder of the review is devoted to a more detailed examination of the function of the duodenal receptors responding to osmotic pressure, acid (the effectiveness of which is related inversely to molecular weight), and fatty acids (particularly those with more than 12 carbon atoms). It is concluded that the control of gastric emptying cannot be understood without quantitative knowledge of duodenal events of which we are largely ignorant.

887 **THE EFFECT OF ATROPINE ON THE GASTROESOPHAGEAL SPHINCTER.** *(E.)* Lind, J. F. (Winnipeg Gen. Hosp., Manitoba, Canada), J. S. Crispin and D. K. McIver. *Canad. J. Physiol. Pharmacol.* 46(2):233-238, 1968.

Manometric studies were carried out on the stomach, gastroesophageal sphincter, and esophagus of 14 normal subjects (19-34 yr old) to assess the effect of atropine (both under resting conditions and during abdominal compression) and to test the hypothesis that the efferent limb of the reflex are causing a rise in sphincteric pressure during abdominal compression is mediated by a cholinergic mechanism. The investigations were carried out in two parts. In the first part, manometric recordings were made from each of 7 subjects on two separate days: on the control day, two separate injections of saline were given and pressures were recorded with and without abdominal compression after each injection; on the test day, the same procedure was followed except that the second injection was atropine (0.015 mg/kg). In the second part of the study, pressures from each of 7 other subjects were recorded on one day only, both before and after i.v. injections of saline and atropine (0.025 mg/kg). The pressure characteristics of the stomach, sphincter (maximal pressure), and esophagus did not vary significantly at different times on the same day or on subsequent days. The higher dosage of atropine produced a significant decrease in mean maximal pressure in the sphincter, both under resting conditions and during abdominal compression, but did not affect pressures in the stomach or esophagus; the effect on the response of the sphincter to abdominal compression was more pronounced than that on the resting pressure. It is concluded that a cholinergic mechanism is partially responsible for the pressure maintained in the gastroesophageal sphincter under resting conditions, as well as for maintaining the functional integrity of the sphincter during abdominal compression. In view of the fact that symptoms of reflux occurred during abdominal compression under the influence of atropine in two cases, it is likely that anticholinergic drugs may aggravate rather than ameliorate reflux esophagitis.

888 **AN ELECTROPHYSIOLOGICAL STUDY OF SOME RETICULO-RUMINAL AND ABOMASAL REFLEXES IN SHEEP.** *(E.)* Iggo, A. (Dept. Vet. Physiol., U. Edinburgh, Scotland) and B. F. Leek. *J. Physiol.* 193(1): 95-119, 1967.

889 **TONIC SUPRASPINAL MECHANISMS INFLUENCING THE INTESTINO-INTESTINAL INHIBITORY REFLEX.** *(E.)* Johansson, B., O. Jonsson and B. Ljung. *Physiol. Scand.* 72(1-2):200-204, 1968.

890 **A RELATION BETWEEN THE CHAIN LENGTH OF FATTY ACIDS AND THE SLOWING OF GASTRIC EMPTYING.** *(E.)* Hunt, J. N. (Guy's Hosp. Med. Sch., London, S.E.1) and M. T. Knox. *J. Physiol.* 194(2): 327-336, 1968.

See also abstract nos.: 1139,1141,1316,1410

891 **DISRUPTION OF KUPFFER CELLS DURING SYSTEMIC ANAPHYLAXIS IN THE MOUSE. I. PROPERTIES AND DISTRIBUTION OF HEAT- AND FORMALDEHYDE-STABLE LIVER ACID p-NITROPHENYLPHOSPHATASE.** *(E.)* Treadwell, P. E. (Dept. Path., Emory U., Atlanta, Ga.) and C. A. Santos-Buch. *Amer. J. Path.* 51(4):483-503, 1967.

Biochemical and cytochemical studies on various fractions of liver homogenates prepared from 6-8 week-old Webster-Swiss BRVS mice revealed the presence of at least 3 different acid phosphatases in mouse liver: a heat-labile and formaldehyde-labile enzyme which is associated with the crude cytoplasmic fraction and also appears in the plasma; a largely microsomal enzyme which is heat-stable but labile to formaldehyde; and a lysosomal enzyme which retains almost all of its activity after heating to 37C for 15 min in 0.24 M formaldehyde. The lysosomal fraction of the liver homogenate (obtained by differential centrifugation after disruption with Triton) was chromatogrammed on Sephadex G-200 and the eluates with peak acid-phosphatase activity were concentrated by pervaporation and dialyzed against sodium acetate buffer, pH 4.8. These studies showed that the heat- and formaldehyde-stable enzyme is a negatively charged protein with a molecular weight above 100,000. Its distribution within the cell (mostly mitochondrial and lysosomal) resembles that of β-glucuronidase. Ultracytochemical assay showed that the enzyme is closely associated with the membrane that binds the cytoplasmic dense bodies of liver tissue, being localized on the outer lamellae of the lysosomes, within the lysosomes themselves, and in the Golgi apparatus of the Kupffer cells and liver parenchymal cells. Before treatment with heat and formaldehyde, acid-phosphatase activity was also demonstrated within the profiles of the smooth endoplasmic reticulum near the stores of glycogen particles and on the surface of the villi of the biliary canaliculi, but this enzyme is apparently of the labile type. In contrast to other reports in the literature, the activity of heat- and formaldehyde-stable lysosomal acid phosphatase was unaffected by the presence of calcium, ferrous, ferric, magnesium or manganese ions, hydrogen peroxide, glucose-6-phosphate, β-glycerophosphate, phenolphthalein glucuronic acid, or phosphovitin. The enzyme was activated by 2-mercaptoethanol and low concentrations of cysteine, but was inhibited by phosphate, fluoride, molybdenum, ATP, and high concentrations of cysteine (100 mM).

892 **DISRUPTION OF KUPFFER CELLS DURING SYSTEMIC ANAPHYLAXIS IN THE MOUSE. II. CHANGES IN TISSUE AND PLASMA HEAT- AND FORMALDEHYDE-STABLE ACID p-NITROPHENYLPHOSPHATASE.** *(E.)* Santos-Buch, C. A. (Dept. Path., Emory U., Atlanta, Ga.) and P. E. Treadwell. *Amer. J. Path.* 51(4):505-525, 1967.

The enzyme described in the preceding paper was assayed in the plasma, livers and small intestinal mucosa of mice subjected to anaphylactic shock (i.v. injection of an LD_{50} of antigen-antibody complexes prepared with mouse antibodies against egg albumin, bovine serum albumin, or horse spleen ferritin) in order to correlate the release of lysosomal acid phosphatase into the plasma with fine-structural changes in the Kupffer cells. Evidence of rapid phagocytosis of soluble antigen-antibody complexes by Kupffer cells was observed within 2 min after their i.v. injection. Within 5 min, vacuolation, budding and breaks in the limiting membranes of the lysosomes were seen, followed by swelling of the Kupffer cells and, 10-20 min after injection, by characteristic breaks in the cytoplasmic membrane, nuclear envelope and endoplasmic reticulum. The lysosomes apparently spilled their contents into the cytoplasm, and by 20 min, the Kupffer cells had often spilled their contents into the lumens of hepatic sinusoids. Sequestration of erythrocytes and leukocytes within the liver sinusoids was accompanied either by denudation of the sinusoidal lining or by regeneration of the lining Kupffer cells. Within 5 min after injection of the antigen-antibody complexes, the heat- and formaldehyde-stable acid phosphatase activity was significantly increased in the plasma, as well as in the liver supernatant fraction and both lysosomal and supernatant fractions of the small intestine, but was sharply decreased in the liver lysosomal fraction. This decrease, however, was temporary (30-60 min), and could not be reproduced *in vitro.*

893 **EFFECT OF THE UNCOUPLING OF OXIDATIVE PHOSPHORYLATION ON THE SUBCELLULAR DISTRIBUTION OF ^{45}Ca AND ^{89}Sr IN RAT LIVER.** *(It.)* Carafoli, E. (Inst. Gen. Path., U. Modena, Italy). *Sperimentale* 117(1):31-51, 1967.

The effect of *in vivo* treatment with uncouplers of oxidative phosphorylation on the distribution of radiocalcium and radiostrontium in the subcellular fractions of rat liver was studied in adult male Wistar rats given 10 μC of $^{45}CaCl_2$ or 20 μC of $^{89}SrCl_2$ i.p. Pretreatment with pentachlorophenol (60 mg/kg i.p. 3 min before the injection of $CaCl_2$ and 9 min before sacrifice) markedly reduced the amount of radioactivity associated with the mitochondrial fraction and increased the amount associated with the microsomes and soluble supernatant; the concentration of isotope with respect to unfractionated homogenate which normally takes place in the mitochondria was eliminated. Thus, after pentachlorophenol or 2,4-dinitrophenol (same dosage), only 16-25% of the the radiocalcium was associated with the mitochondria, 29-30% with the microsomes, and 13-14% in the supernatant. The results were essentially the same with strontium. At lower doses of pentachlorophenol (30 mg/kg), however, which did not completely uncouple oxidative phosphorylation, there was no effect on the Sr distribution. This and other *in vitro* studies would seem to indicate that there are two pools of Ca and Sr in the liver cell mitochondria, only one of which is sensitive to the uncoupling of oxidative phosphorylation. Thus, treatment of mitochondria isolated from normal rats with dinitrophenol *in vitro* led to the loss of about 60% of the calcium, but in mitochondria from rats pretreated with pentachlorophenol, dinitrophenol had no effect since the mitochondrial Ca content was already decreased to about one third of normal levels. The results of these studies indicate that the transport of Ca and Sr into the mitochondria against a concentration gradient is linked to the energy-producing steps of the oxidative chain.

894 **DISTRIBUTION OF ^{45}Ca AND ^{89}Sr IN MITOCHONDRIA AND OTHER SUBCELLULAR**

STRUCTURES OF RAT LIVER *IN VIVO.* *(It.)* Carafoli, E. (Inst. Gen. Path., U. Modena, Italy). *Sperimentale* 117(1):19-30, 1967.

The incorporation of radiocalcium and radiostrontium into the subcellular fractions of rat liver was studied after i.p. injection of 10 μC of $^{45}CaCl_2$ or 20 μC of $^{89}SrCl_2$ in adult males. Within 2-5 min after injection of the isotope, the largest part of both the Ca and Sr in the liver cell was associated with the subcellular structures, only negligible amounts of radioactivity being found in the cytoplasm. Chemical analysis showed that 34% of the total Ca was associated with the mitochondria and 33% with the microsomes; however, 55% of the radioactivity was associated with the mitochondria and only 15% with the microsomes, indicating that the mitochondrial calcium is much more active metabolically. The specific activity of the calcium was also 4-20 times as high in the mitochondria as in the microsomes, and mitochondria were found to be the only subcellular structures capable of concentrating Ca or Sr. In the case of Sr, the distribution varied significantly with time: immediately after injection, about 60% of the total radioactivity was associated with the mitochondria and negligible amounts were found in the endoplasmic reticulum and the soluble supernatant; after 60 min, however, the mitochondria had lost much of their Sr and the concentration in the microsomes, endoplasmic reticulum and soluble supernatant had increased considerably. The results are consistent with the view that the mitochondria play a predominant role in the metabolism of both Ca and Sr in the intact liver.

895

ACTIVITY OF A NEW PANCREATIC SUBSTANCE ON LIPID METABOLISM. *(E.)* Bianchini, P. (Micron Lab. Clin. Chem., Modena, Italy), B. Osima and R. Casetta. *G. Arterioscler.* 5(6):597-605, 1967.

The complex sulfomucopolysaccharide previously isolated from rat pancreas was found, by electrophoresis on cellulose acetate gel, to be composed of one orthochromatic and 3 metachromatic components with similar structure but varying molecular weight. A low-molecular-weight fraction was then isolated by dialysis against distilled water through cellophane for 18 hr; this fraction was found to be electrophoretically homogeneous but still showed a metachromatic reaction with toluidine blue, caused the disappearance of Rivanol (2-ethoxy-6,9-diaminoacridine lactate) fluorescence *in vitro,* and activated the release of Clearing Factor when injected i.p. into rats. The absorption of this low-molecular-weight fraction through the intestinal wall was demonstrated *in vitro* using the everted duodenal sac technique of Crane and Wilson. Furthermore, oral administration of the compound at a dose of 300 ULS/kg to 250-g rats was found to produce a significant increase in the plasma free fatty acids. [One ULS is defined as the amount required to activate the release of Clearing Factor within 10 min after i.v. injection into a 200-g rat, the Clearing Factor being demonstrated by a 50% decrease in the optical density of a 1:2 Ediol/plasma mixture within 15 min]. In rats made hyperlipemic by i.v. injection of Triton WR 1339 (200 mg/kg), the same dose of pancreatic heparinoid increased the plasma free fatty acids further, but tended to return the triglycerides and β-lipoproteins to normal levels. This is ascribed to the activation of a β-lipoproteinolipase. Gas-liquid chromatography of the free and esterified fatty acids in the livers of these rats showed that the levels of all the free fatty acids except arachidonic were essentially normal in animals given both Triton and pancreatic heparinoid; arachidonic acid remained somewhat elevated. However, the total fatty acids in the liver showed little change after Triton alone and were markedly increased by pancreatic heparinoid. It is postulated that this substance plays a role in regulating the lipid metabolism of the liver.

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DEGRADATION OF BILE SALTS BY HUMAN INTESTINAL BACTERIA. *(E.)* Hill, M. J. (St. Mary's Hosp. Med. Sch., London, England) and B. S. Drasar. *Gut* 9(1):22-27, 1968.

Pure cultures of a wide variety of human intestinal microorganisms were tested for the presence of taurocholate amidase, which catalyzes the deconjugation of bile, and cholate-7-dehydroxylase. The first enzyme was found to be widely distributed among intestinal bacterial, particularly among those strains found in the feces. Although taurocholate amidase was not found in any strains of *Escherichia coli, Pseudomonas* sp., nonfecal streptococci, aerobic lactobacilli, or yeasts, it was present in 94% of all strains of *Clostridium* sp., 30-48% of *Veillonella, Bifidobacteria* and *Bacteroides,* 50% of *Streptococcus faecalis,* and even in 21% of the strains of *Staphylococcus aureus.* Some oral strains of *Bacteroides* and *Bifidobacteria,* which did not have the enzyme initially, developed the ability to deconjugate bile after repeated subculture on media containing bile; this was not true, however, of other genera. The enzyme was mostly intracellular (85-100%), except in the case of *Bifidobacteria* where it was mostly extracellular. The enzyme cholate-7-dehydroxylase was much rarer, being found in only 8-12% of *Bacteroides, Clostridia* and *Veillonella* and in 2% of the strains of *S. faecalis.* The pH optimum of all the enzymes was between 6 and 7, but cholate-7-dehydroxylase was inhibited only by merthiolate, and the taurocholate amidase from the different bacteria showed differing susceptibilities to inhibitors. Thus, the taurocholate amidase from *Bacteroides, S. faecalis* and *Bifidobacteria* was uniformly inhibited by peridate or cupric ions, but only the enzyme from *Bacteroides* and *Bifidobacteria* (not that from *S. faecalis*) was inhibited by formaldehyde, and only scattered strains showed inhibition by merthiolate, fluoride or azide. It is pointed out, in connection with the usual absence of conjugate bile from the feces, that *Bacteroides* and *Bifidobacteria* are by far the most numerous of the intestinal bacteria, in addition to being found in saliva.

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ADVANTAGES OF THE USE OF A UNIFORM PREPARATION OF RADIOACTIVE ALBUMIN IN THE DETERMINATION OF HEPATIC BLOOD FLOW. *(Fr.)* Silva Carvalho, J. (Inst. Physiol., Fac. Med., Lisbon, Portugal), H. Novais and L. Catela. *C.R. Soc. Biol. (Paris)* 161(7):1670-1673, 1967.

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EFFECT OF MINERAL OIL INGESTION ON GROWTH AND LIVER LIPID COMPOSITION IN THE RAT. *(E.)* Vachha, S. M. (Burnsides Res. Lab., U. Illinois, Urbana), F. A. Kummerow and E. G. Perkins. *Proc. Soc. Exp. Biol. Med.* 126(1):258-263, 1967.

HEPATIC METABOLISM

899 INHIBITION OF RAT LIVER MICROSOMAL N-DEMETHYLASE BY α-NAPHTHYLISOTHIOCYANATE: STUDIES WITH PUROMYCIN AMINONUCLEOSIDE. *(E.)* Derr, R. F. (Minneapolis VA Hosp., Minn.), D. K. Loechler, C. S. Alexander and H. T. Nagasawa. *Proc. Soc. Exp. Biol. Med.* 126(3):844-845, 1967.

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901 TRANSPORT AND STORAGE OF ^{14}C-RIBOFLAVIN IN THE RETINA AND LIVER OF RATS. *(E.)* Foley, B. (Grad. Sch. Nutrit., Cornell U., Ithaca, N. Y.), R. E. MacKenzie and D. B. McCormick. *Proc. Soc. Exp. Biol. Med.* 126(3):715-718, 1967.

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904 AN ANDROGENIC BASIS FOR THE SEXUAL DIFFERENCE IN L-ASCORBIC ACID BIOSYNTHESIS IN RATS. *(E.)* Stubbs, D. W. (U. Texas Med. Branch, Galveston), J. B. McKernan and D. B. Haufrect. *Proc. Soc. Exp. Biol. Med.* 126(2):464-467, 1967.

905 ANTIHEMOPHILIC FACTOR RELEASE BY PERFUSED LIVER AND SPLEEN: RELATIONSHIP TO HEMOPHILIA. *(E.)* Norman, J. C. (Harvard Med. Sch., Boston, Mass.), J. P. Lambilliotte, Y. Kojima and H. S. Sise. *Science* 157(3804):1060-1061, 1967.

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908 HEPATIC SYNTHESIS AND SECRETORY RELEASE OF PLASMA α_2(ACUTE PHASE)-GLOBULIN APPEARING IN MALIGNANCY. *(E.)* Sarcione, E. J. (Roswell Park Mem. Inst., Buffalo, N. Y.). *Cancer Res.* 27(11):2025-2033, 1967.

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914 EFFECT OF ETHANOL ON LIVER δ-AMINOLAEVULINATE SYNTHETASE IN RATS. *(E.)* Shanley, B. C. (Dept. Chem. Path., U. Natal, Durban, S. Africa), S. S. Zail and S. M. Joubert. *Lancet* 1(7533):70-71, 1968.

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916 BIOCHEMICAL AND CLINICAL ASPECTS OF THE ENTEROHEPATIC CIRCULATION OF OESTROGENS. *(E.)* Adlercreutz, H. (Dept. Clin. Chem., U. Helsinki, Finland) and T. Luukkainen. *Acta Endocr.* 56(S124):101-140, 1968.

917 A FISTULA FOR MEASUREMENT OF BILE FLOW AND COMPOSITION IN THE DOG. *(E.)* Fletcher, D. M. (U. Leeds, England) and R. L. Corry. *Gut* 9(1):129-130, 1968.

918 HISTOPHYSIOLOGY AND HISTOPATHOLOGY OF NONSPECIFIC PHOSPHATES OF THE LIVER AND KIDNEYS. *(Rus.)* Nesvetov, A. M. (I. M. Sechenov 1st Moscow Med. Inst., USSR). *Arkh. Pat.* 30(1):76-81, 1968.

919 MICROCIRCULATION AND HEMODYNAMICAL ANALYSIS OF THE BLOOD CIRCULATION IN THE LIVER. *(E.)* Nakata, K. (Osaka Med. Coll. Takatsuki, Japan). *Acta Path. Jap.* 17(3):361-376, 1967.

See also abstract nos.: 790,1261

DIAGNOSTIC PROCEDURES AND GENERAL THERAPY

920 PARIETOGRAPHY IN THE DIFFERENTIAL DIAGNOSIS OF GASTRIC DISEASES. *(Rus.)* Firsov, E. F. (Kursk Med. Inst., USSR). *Sovet. Med.* (2):58-63, 1968.

Parietography, a technique originally proposed by Saito in 1933, involves a 3-stage procedure: pneumoperitoneum (1.0-1.5 liters of air), insufflation of air into the stomach (250-300 ml), and the taking of the parietogram or tomoparietogram. The advantages of this radiological procedure are illustrated by the author's experience with 187 patients, 127 of whom eventually came to surgery. Most (155) of these had cancer of the antral segment or body of the stomach, while 14 had various types of gastritis, 12 had chronic ulcers (6 of the pyloroduodenal area and 8 of the lesser curvature), and 6 had gastric polyps. In a number of cases, parietography was instrumental in solving difficult problems of differential diagnosis, particularly between gastritis and infiltrative forms of cancer or between polypoid gastritis and true polyposis; the procedure was also helpful in determining the nature of pyloric stenosis and ulcerous niches in the lesser curvature. There were no complications referrable to the diagnostic procedure.

921 THE RATE OF PROGRESSION OF LONG INTESTINAL TUBES IN A DOG WITH A JEJUNAL FISTULA. *(E.)* Murata, A. (Dept. Physiol., U. Illinois, Urbana), F. R. Steggerda, J. C. Cooley, E. R. Ensrud and C. Gianturco. *Amer. J. Dig. Dis.* 12(11):1091-1094, 1967.

Comparative tests of the rate of progression of 5 types of commercially available intestinal tubes, filled with water, mercury or air, and 7 experimental tubes in a 14-kg dog with a jejunal fistula of the Maydl type 70 cm above the ileocecal valve revealed that the Cantor polyvinyl tube filled with mercury gave the best performance (29 cm in 2 hr). The Kaslow polyvinyl tube filled with water was almost as good (24 cm), but tubes of rubber and Miller-Abbott tubes gave poor results (progression of 17 cm or less in 2 hr). High rates of progression (about 25 cm in 2 hr) were also achieved with an experimental polyvinyl Cantor tube carrying a loop tip and with an unkinkable stainless-steel tube covered with thin Silastic and carrying a Cantor bag filled with mercury. The results show that extreme flexibility is not desirable, although unkinkability is, and that the propulsive tip should offer a good grip to the peristaltic waves.

922 BIOPSY OF THE SMALL INTESTINE. *(Ger.)* Massewitsch, C. (Leningrad Inst Sanit. Hyg., USSR). *Deutsch. Zschr. Verdau. Stoffwechselkr.* 27(3/4):69-76, 1967.

Based on experience with more than 300 cases, the author evaluates the apparatus currently in use for aspiration biopsy of the small intestine and discusses the morphological and histochemical changes which can be detected in the intestinal mucosa. Semi-rigid catheters, rather than fully flexible or 2-channel tubes, are recommended for biopsy of the upper small intestine, since they are easier to visualize by X-ray; a 2-channel catheter may be necessary, however, for the lower small intestine. In any event, the sample should weigh about 20-28 mg and should be taken at a negative pressure of 280-300 mm Hg for 2 seconds through a capsule opening of 2.5 mm. Pathological changes which can be seen microscopically include atrophy, inflammation, edema, proliferation of the blood and lymphatic vessels, plasma-cell and lymphocytic infiltration, and loss of superficial epithelium. Proper diagnosis is also aided by electron microscopy and by histochemical tests such as the determination of amylase, for which a method is outlined. Among a total of 102 patients subjected to duodenal biopsy, 38 (26 of 70 with peptic ulcer and 12 of 32 with chronic gastritis) had a normal duodenal mucosa. Duodenitis was found in 25 (20 with peptic ulcer and 5 with gastritis) and atrophy of the duodenal mucosa in 39 (21 of 38 with duodenal ulcer, 3 of 32 with gastric ulcer, and 15 of 32 with gastritis). Similarly, among 95 patients subjected to jejunal biopsy, 44 (32 of 61 with peptic ulcer and 12 of 34 with chronic gastritis) had a normal jejunal mucosa, 26 (14 with peptic ulcer and 12 with gastritis) had jejunitis and 25 (15 with peptic ulcer and 10 with gastritis) showed jejunal atrophy. The amylase activity was normal in 39 cases (18 of 28 with duodenal ulcer, 12 of 15 with gastric ulcer and 9 of 25 with chronic gastritis) and decreased in 56.

923 β-GALACTOSIDASE ACTIVITY IN JEJUNAL BIOPSY MATERIAL FROM ADULTS. *(Ger.)* Diwok, K. (Med. Clin., U. Rostock, Germany) and H. J. Hütter. *Deutsch. Zschr. Verdau. Stoffwechselkr.* 27(3/4):77-81, 1967.

Quantitative determinations of the lactase activity in samples of jejunal mucosa taken by means of a Sielaff catheter from 30 patients with a variety of gastrointestinal diseases revealed abnormally low values (0.05-0.18 U/g) in 7 cases; only one of these 7 patients (a case of secondary sprue due to jejunocolonic fistula and probable regional enteritis) showed microscopic signs of jejunitis and villous atrophy, while the other 6 had chronic pancreatitis, nonspecific abdominal symptoms, or gastric polyps. Two other patients (collagen disease and adrenocortical insufficiency) had lactase values of 0.21-0.29 U/g, and 10 had values between 0.35 and 0.84 U/g, which are in the low-normal range. Since many patients with chronic gastritis or pancreatitis had values up to 3.95 U/g, however, determinations of lactase activity would seem to be of limited diagnostic value. The point is made that lactase deficiency may be a fairly common cause of abdominal symptoms, and is not always revealed by a history of milk intolerance or even by abnormal lactose tolerance tests; on the other hand, milk intolerance may be due to other factors besides low β-galactosidase levels.

924 DETECTION OF VERY SMALL COMMON DUCT STONES BY MEANS OF RADIOMANOMETRY COMBINED WITH RETROPANCREATIC RADIOGRAPHY. *(Fr.)* Yvergneaux, J. P. (19 Boulevard Roosevelt, Ghent, Belgium), W. van der Vyver and E. Yvergneaux. *Acta Gastroent. Belg.* 30(7):513-522, 1967.

Experience with more than 1000 cases has shown that small choledochal stones (0.4-0.7 cm in diameter) can escape detection by classical radiomanometry, even when coupled with careful palpation, in 2-5% of the cases. Such stones, despite their small size, are held responsible for many false diagnoses of odditis and many cases of "post-cholecystectomy syndrome" or recurrent pancreatitis. Combination of radiomanometry with retropancreatic radiography has been found, in about 250 of these cases, to be effective in the detection of presphincteric choledochal microlithiasis, and has reduced the diameter below which stones can still escape detection to about 1.0 mm. Techniques for radiomanometry and retropancreatic radiography are discussed and several cases are presented by way of example.

925 **THE FUNCTIONAL EXPLORATION OF THE SMALL INTESTINE.** *(Fr.)* Bernier, J.-J. (St. Lazare Hosp., Paris, France), J.-C. Rambaud and J.-C. Bognel. *Rev. Prat.* 18(9 bis):1391-1407, 1968.

In the introduction to a detailed review of techniques for the study of the small intestine, it is pointed out that this field was was opened up by two basic technical innovations: radioisotopic tracer studies and jejunal biopsy. Since then, however, several other promising techniques have been developed, including histoenzymology, immunofluorescence, electron microscopy, and the direct study of absorption processes, either by jejunal intubation or by serial studies of the blood. It is further pointed out that functional studies on the small intestine are necessary in two basic situations: first, in known disorders in which the small intestine usually plays a role; and second, in the case of diarrhea, even though in 90% of the cases, diarrhea is caused by a malfunction of the colon, not the small intestine. In this connection, diarrhea can be classified into metabolic and nonmetabolic types, While the large intestine is usually responsible for the latter, the former can be due either to maldigestion (malfunction of the liver, stomach, or pancreas) or to malabsorption. It is in the diarrheas due to malabsorption that functional studies on the small intestine play an important role. The main body of the review then goes on to deal with the techniques and significance of radiological studies on the small intestine (barium transit studies, arteriography and lymphography); isotopic and biochemical studies on the small intestine (determinations of fecal fat, creatine, water, and electrolytes); studies of the appearance of ingested carbohydrates, proteins, or lipids in the blood or urine; tracer studies of intestinal absorption by means of intubation; and indirect methods (such as the study of plasma proteins or electrolytes, the blood picture, phosphorus and calcium metabolism, the intestinal flora, and vitamin deficiencies); and intestinal biopsy (including the techniques of immunofluorescence, electron microscopy, and histoenzymology). The review ends with a table listing 33 types of intestinal malabsorption and exudative enteropathy in which dysfunction of the small intestine plays a primary role. It is pointed out that the length of this list depends mainly on the number of tests of small intestinal function which have been developed. These tests can be classified into three main groups: those which are accessible to the general practitioner (stool examination, radiology, glucose tolerance), those which are in the domain of the gastroenterologist (radioisotope studies, jejunal biopsy), and those which require the specialized facilities of diagnostic centers (absorption studies using intestinal perfusion, studies of the absorption of tritiated vitamin D or radioiron, electron microscopy, histoenzymology, or the detection of specific proteins in the stools).

926 **COMPARATIVE STUDIES ON THE APPLICABILITY OF THE XYLOSE TEST FOR EVALUATING RESORPTION DISTURBANCES IN THE SMALL INTESTINE.** *(Pol.)* Kryszewski, A. (1st Clin. Int. Med., Acad. Med., Danzig, Poland). *Pol. Arch. Med. Wewn.* 40(1):77-81, 1968.

Two variants of the xylose absorption test were compared in two groups of healthy volunteers without renal or gastrointestinal disease. Among 10 subjects (5 men and 5 women, 23-47 yr old) given 25 g of d(+)xylose in 500 ml of water, followed by 250 ml water one hr later, 30.04 ± 8.06% of the administered dose was excreted in the urine in 5 hr and the maximal blood level (53.90 ± 8.8 mg%) was observed one hr after ingestion. Among 14 subjects (9 men and 5 women, 20-60 yr old) given 5 g of d(+)xylose in 200 ml of water, followed by 200 ml of water one hr later, 36.3 ± 8.00% of the administered dose was excreted in the urine in 5 hr, and the maximal blood level (16.21 ± 5.60 mg%) was also observed one hr after ingestion. The urinary excretion was thus practically the same in the two groups. Although the blood levels varied over a somewhat wider range after 5 g of xylose, this dose also eliminated the side effects. The renal excretion was still comparable at the two dose levels in two patients with lowered excretion due to hepatic cirrhosis. A dose of 5 g is therefore recommended for the xylose absorption test in clinical practice.

927 **QUANTITATIVE DETERMINATIONS OF THE SERUM IMMUNOGLOBULINS IN INFLAMMATORY LIVER DISEASE. I. NORMAL VALUES AND STUDIES DURING ACUTE HEPATITIS.** *(Ger.)* Gleichmann, E. (Med. Inst., Hannover, Germany) and H. Deicher. *Klin. Wschr.* 46(4):171-176, 1968.

The serum concentrations of IgG (γ_2-globulin), IgA (γ_1A-globulin), and IgM (γ_1M-globulin) were first determined in 100-150 normal subjects using a radial immunodiffusion technique; the average normal values obtained (in mg/ml) were 11.8 ± 2.3 for IgC, 2.4 ± 0.9 for IgA, and 1.5 ± 0.7 for IgM. Subsequent studies in 20 patients (10 males and 10 females) with acute viral hepatitis revealed a marked increase (average 252%) in IgM, reaching a maximum of 5.4 ± 2.2 mg/ml during the first week after the onset of jaundice, with only a moderate increase in IgC (to a maximum of 17.0 ± 2.1 mg/ml during the 2nd week), and hardly any change in IgA. The IgM levels in these patients all returned to normal within 6 weeks, while in two women with chronic hepatitis the IgM levels remained elevated for several months. It is suggested that quantitative determinations of the individual immunoglobulins may be helpful in the differential diagnosis of the various types of liver disease. Thus, an increase in IgA together with IgM would be an indication of toxic liver damage and superimposed hepatitis, rather than acute viral hepatitis, while an increase in IgG could be an indication of chronic "lupoid" hepatitis. Such individual determinations are much more sensitive to modifications in the disease picture than are other liver function tests.

928 **SERUM SIALIC ACID LEVELS IN PATIENTS WITH ACUTE APPENDICITIS.** *(Rus.)* Udod, V. M. (Tselinograd Med. Inst., USSR) and P. K. Andrun'. *Klin. Khir.* (2):35-38, 1968.

Since a review of 1,822 cases of acute appendicitis revealed that diagnostic errors had been made in 18.6%, a need was felt for a more objective method for the diagnosis of this disease. Determinations of the serum sialic acid levels in 28 healthy controls

(18-50 yr old) and 94 patients with subsequently confirmed acute appendicitis (41 males and 53 females, from <10 to 70 yr of age) revealed the following ranges and average values (in optical density U): controls: 0.173 (0.130-0.205); catarrhal appendicitis: 0.245 (0.170-0.330); phlegmonous appendicitis: 0.280 (0.180-0.410); and gangrenous appendicitis: 0.323 (0.230-0.412). The serum sialic acid was found to increase during the first few hr of the disease, and to be above normal in 92% of all cases (from 84% of catarrhal cases to 100% of gangrenous cases). This test is thus much more reliable than any of the other signs (fever, leukocytosis, increased pulse, etc.) which are commonly relied upon, but which can be absent in as many as 35-50% of all cases.

929 OVERESTIMATION OF THE EXTENT OF DISEASE DURING EXPLORATORY LAPAROTOMY FOR NEGLECTED CANCER OF THE STOMACH.

(Rus.) Sagaidak, V. N. (Inst. Exp. Clin. Oncol., Acad. Med. Sci. USSR, Moscow). *Klin. Khir.* (2):61-63, 1968.

Autopsy findings in 49 patients with stomach cancer who died shortly after exploratory laparotomy were compared with the surgeon's report as to the extent of disease and metastasis. Whereas the surgeon reported involvement of the gastric serosa in 30 of these cases, this was confirmed at autopsy in only 22. Similarly, involvement of the pancreas was reported in 18 cases and confirmed in 9, and there was no confirmed involvement of the diaphragm although the surgeon had reported it in 5 cases. Involvement of the intestinal mesentery and the abdominal wall or retroperitoneal space was confirmed at autopsy in 3 of 6 and 2 of 6 cases, resp., but involvement of the liver and omentum was confirmed in 6 of 7 and 6 of 8 cases, resp. Metastasis to the lymph nodes, reported in 36 cases by the surgeon, was found in only 19 cases at autopsy. Similarly, peritoneal metastasis was confirmed in only 7 of 14 cases. In the case of the liver, however, metastasis was confirmed in 16 of 18 cases, and the other two had liver involvement by the primary tumor. This pessimistic overestimation on the part of the surgeon is ascribed to the various types of nonspecific processes which normally accompany tumor growth.

930 THE IMPORTANCE OF STUDYING THE PANCREATIC JUICE IN CANCER OF THE PANCREAS.

(Rus.) Abasov, I. T. (Azerbaijan Inst. Roentg. Radiol. Oncol., Baku, USSR). *Vop. Onkol.* 14(1):12-17, 1968.

Pancreatic juice obtained by duodenal catheter after injection of secretin was investigated in 33 patients (15 males and 18 females, most over 50 yr of age) with cancer of the pancreas of 3 weeks to 7 months duration, as well as in 16 healthy volunteers and 174 patients with other diseases of the stomach, liver, pancreas and bile ducts. Among the patients with cancer of the pancreas, 25 were jaundiced, this representing all but 2 of the cases involving the head of the pancreas; blood was found in the duodenal aspirate in 7 of 27 cases with cancer of the head of the pancreas, as well as in 2 of 4 patients with cancer of the head of the pancreas, as well as in 2 of 4 patients with cancer of the ampulla of Vater; hyperglycemia was found in 10 of 25 cases studied; elevated serum amylase levels in 5 of 20; and elevated serum lipase in 6 of 19 with cancer of the pancreas. The volume of pancreatic juice secreted (in ml/kg/hr) was sharply decreased in patients with cancer of the head of the pancreas (to 0.73 ± 0.39 compared to 2.40 ± 0.62 in controls); the decrease was less marked (to 1.24 ± 0.30) in cancer of the pancreas without jaundice; and still less marked (to 1.72 ± 0.83) in chronic pancreatitis. The maximal bicarbonate concentration (in mEq/liter), which is characteristically decreased in chronic pancreatitis (to 41 compared to 92 in controls), was decreased to 54 ± 25 in cancer of the pancreas with jaundice and to 72 ± 23 in cancer of the pancreas without jaundice. Similar results were obtained for the excretion of amylase, trypsin, and lipase (in U/kg/hr), all of which were most markedly decreased in cancer of the head of the pancreas and fairly sharply decreased in pancreatic cancer without jaundice. Trypsin secretion was also decreased, however, in chronic pancreatitis, cancer of the ampulla of Vater, and cholelithiasis with obstructive jaundice, and lipase secretion was markedly decreased in these conditions, as well as in viral hepatitis. While a decreased volume and enzyme content of the pancreatic juice is a valuable diagnostic sign in cancer of the pancreatic head, cytological examination of the pancreatic juice becomes more important in cancer of the body and tail of the pancreas. Atypical cells were discovered in the duodenal aspirate in 9 of 23 cases of pancreatic cancer (including 3 of 5 without jaundice), as well as in 2 of 4 patients with cancer of the ampulla of Vater, 1 of 6 with stomach cancer, and 1 of 13 with chronic pancreatitis (false positive), but were not detected in any of 7 controls, 6 patients with hepatitis, or 6 with cholelithiasis.

931 THE VALUE OF ENZYME STUDIES FOR THE LONG-TERM OBSERVATION OF ACUTE AND CHRONIC LIVER DISEASES.

(Ger.) Hötzl, H. A. (Munic. Hosp., Berlin-Wilmersdorf, Germany), G. Laudahn and M. Smerling. *Deutsch. Med. J.* 19(6):177-186, 1968.

The serum glutamic-oxaloacetic and glutamic-pyruvic transaminase levels were determined at regular intervals, along with the serum bilirubin, thymol turbidity, and other liver-function tests, in 4 cases of acute hepatitis, 16 of chronic hepatitis, and 19 of cirrhosis, 27 of which were observed for at least 3 yr (one as long as 7 yr). Nine of these cases are described in detail. Based on the findings in these 39 patients, serial determinations of the serum transaminase levels are recommended as a valuable tool for the early detection of recurrent attacks and the evaluation of the prognosis of chronic cases. In acute hepatitis, the values should return to normal in about 6-8 weeks, otherwise a transition to a chronic form can be suspected. In chronic hepatitis, periods of acutization are heralded by increases in serum transaminase levels before the appearance of other subjective or objective signs. On the other hand, low or falling levels in the presence of a deteriorating clinical condition are a sign of a particularly poor prognosis, indicating dystrophy and intracellular inactivation of the enzymes. Although the maxima are somewhat higher in chronic hepatitis than in cirrhosis of the liver, the difference is insufficient to permit a differential diagnosis, for which biopsy is essential.

932 THE USE OF ARTERIOGRAPHY IN THE DIAGNOSIS OF THE ORIGIN OF ACUTE GASTROINTESTINAL HEMORRHAGE IN CHILDREN.

(E.) Ternberg, J. L. (Washington U. Sch. Med. St. Louis, Mo.) and P. R. Koehler. *Surgery* 63(4):686-689, 1968.

Selective arterial angiography was used successfully to locate gastrointestinal bleeding sites in 2 out of 3 children aged 4-14 yr. Minimum bleeding of 0.5 ml/min is required to detect bleeding sites after contrast medium injection.

933 TREATMENT OF CHRONIC CONSTIPATION WITH LACTULOSE SYRUP: RESULTS OF A DOUBLE-BLIND STUDY.

(E.) Wesselius-De Casparis, A. (Clin. Res. Dept., N. V. Philips-Duphar, Amsterdam, Netherlands), S. Braadbaart, G. E. van den Bergh-Bohlken and M. Mimica. *Gut* 9(1):84-86, 1968.

Among 103 elderly patients of both sexes who were regularly taking laxatives for chronic constipation, 51 apparently did not need a laxative since they had regular defecation during the 2-week post-study period in which all laxatives were withheld. These 51 also showed no significant difference between lactulose and a glucose placebo. In 52 truly constipated patients, analysis of the double-blind study showed that lactulose (8-30 ml of 50% syrup daily for 3 weeks) was effective in eliminating the need for laxatives in 80%, compared to 33% for the glucose placebo. The only side effect of lactulose therapy was occasional transient gas formation and intestinal bloating. Even though the effect of lactulose presumably depends on an alteration in the intestinal flora, there was no carry-over effect after treatment was stopped (need for laxatives returned in 31 of 54 given lactulose and in 21 of 49 given glucose).

934 USE OF 2-DEOXY-D-GLUCOSE TO TEST FOR THE COMPLETENESS OF SURGICAL VAGOTOMY.

(E.) Thomas, D. G. (Royal Infirm., Sheffield, England) and H. L. Duthie. *Gut* 9(1):125-128, 1968.

Insulin and 2-deoxy-D-glucose were compared as techniques for the postoperative assessment of the completeness of surgical vagotomy in 37 patients treated by vagotomy (selective in 5, truncal in 32) and pyloroplasty for chronic duodenal ulcers from one week to 20 months before. Of the 37 patients, 22 showed a positive response to insulin (20 units i.v. within 5 seconds), 7 showing an early response and 15 a late response. All of these patients showed early and more pronounced responses to 2-deoxy-D-glucose (50 mg/kg i.v. in 10 min), the delay being at most 60-75 min compared to the 2 hr required for a late insulin response. However, the prognostic value of the distinction between early and late insulin responses was thus lost. Among 15 patients with negative insulin responses, 11 were also negative to 2-deoxy-D-glucose, but 4 showed a late positive response, the significance of which has not yet been determined. The only side effects due to 2-deoxy-D-glucose (besides the usual symptoms of hypoglycemia) were severe hypothermia and clouding of consciousness in 3 cases, which responded rapidly to i.v. injection of 50% glucose. Liver damage which had been noted in 2 patients given 2-deoxy-D-glucose preoperatively was not observed in this series.

935 THE CASE FOR PERIODIC CANCER DETECTION EXAMINATIONS.

(E.) Gilbertsen, V. A. (U. Minnesota Med. Cent., Minneapolis). *J. Indiana Med. Ass.* 61(4):468-472, 1968.

An analysis of the work of the University of Minnesota Cancer Detection Clinic revealed that among 13,648 patients (all 45 yr of age or older, free of symptoms at the time of first examination and seen yearly thereafter) examined in the period 1948-67, for a total of 69,212 examinations, 567 (307 among 6,447 men and 260 among 7,201 women) were found to have cancer; a cancer was detected during one out of every 79 initial examinations and one out of every 141 recheck examinations. Among the cancers detected by initial proctosigmoidoscopy at the Center were a number of adenocarcinomas of the "rectum" (most distal 25 cm of the bowel), and survival among these patients was substantially better than usual due to the early detection and treatment. However, the 55,000 recheck examinations revealed only 9 adenocarcinomas of this region (4 confined to the mucosa, 4 with involvement of the submucosa, and 1 with involvement of the muscularis) instead of the 32 which could have been expected statistically. All 8 operative survivors were still free of recurrence 5 years later. The low incidence of adenocarcinoma of the rectum in these patients is ascribed to the nearly routine removal of benign-appearing polyps and adenomas following their identification at proctosigmoidscopy. On the other hand, one of the problems in early cancer detection is illustrated by the results of histamine tests for gastric acidity in 409 known stomach cancer patients and 2,470 normal controls. Although most of the cancer patients would have been picked up by gastric analysis (normal acid in 20%), many of the 5-year survivors had free acid (54% achlorhydria, 33% normal acid), 59% of the 5-year survivors, 60 years old or younger, had normal gastric acid, and only 62% of normal controls had normal gastric acid (17% achlorhydria). Selection of the most effective screening techniques is therefore all important.

936 AUGMENTED HISTAMINE TEST IN CASES OF CHRONIC COLITIS AND ANKYLOSTOMIASIS.

(E.) Nath, K. (G.S.V.M. Med. Coll., Kanpur, India), S. N. Agarwal, S. P. Mehta and K. K. Kapoor. *J. Indian Med. Ass.* 50(3):104-110, 1968.

As part of an investigation into the possible relationship between peptic ulcers and chronic inflammation of the large intestine, Kay's augmented histamine test was used to assess the gastric secretory response in 30 normal controls (20 men and 10 women, 17-50 yr old), 45 patients with chronic colitis (32 men and 13 women, 16-55 yr old), and 62 patients with ankylostomiasis (51 men and 11 women, 16-56 yr old). Both males and females with chronic colitis were found to have significantly elevated basal acid outputs, with no change in maximal secretory response, while in ankylostomiasis accompanied by anemia, the basal and maximal acid outputs were both decreased. Thus, in males with chronic colitis, the basal acid output was 6.52 mEq/hr (compared to 3.16 in controls), and the maximal response was 16.21 mEq/hr, while in females the basal output was 4.28 mEq/hr (1.32 in controls), and the maximal response was 10.61 mEq/hr; the ratio between the basal and maximal outputs was thus increased from a normal value of 18-22% to 39-40%. In patients with ankylostomiasis (mean hemoglobin of 4.7-5.7 g%), the basal acid output was only 0.75-1.26, and the maximal output was 6.5-8.4 mEq/hr (higher values in males), but normal acid levels were observed in the 4 patients who did not have anemia. There was no direct correlation between gastric acid secretion and either the hemoglobin or the hookworm ova load. In 7 patients who were successfully dewormed, however, with resultant improvement in anemia as well, the basal and maximal acid outputs both increased. The low gastric secretory response in patients with ankylostomiasis is tentatively ascribed to anemia.

937 **THE DIAGNOSTIC VALUE OF LIVER BIOPSY AND LIVER FUNCTION TESTS IN CARCINOMA.** *(E.)* Schmidt, A. (State Hosp., U. Copenhagen, Denmark). *Dan. Med. Bull.* 15(3):94-96, 1968.

The results of 36 Menghini needle biopsies and 22 biopsies obtained at surgery or by laparoscopy were compared with the liver function tests in 58 patients with carcinoma (33 gastrointestinal, 18 of the liver, gallbladder or pancreas, and 7 other) seen over a 2-year period. Needle biopsy revealed liver metastasis in only one of 9 known cases, compared to 13 of 15 known cases detected by visually controlled biopsy. Cirrhosis was seen in 4 of 36 and 1 of 22, and other abnormalities (including fatty infiltration) were seen in 12 of 36 and 4 of 22, leaving 19 of 36 and 4 of 22 with normal findings. It should be noted, however, that the patients subjected to surgery or laparoscopy were generally more advanced cases and were thus not comparable to the needle biopsy group. There were no complications referrable to the biopsy. Liver function tests revealed increased alkaline phosphatase in 56%, increased lactic dehydrogenase and serum bilirubin in 29% each, increased glutamic pyruvic transaminase in 20%, increased thymol turbidity in 16%, decreased serum albumin in 95%, increased alpha-2 globulin in 76%, and increased α_1-, β-, or γ-globulin in 29-47% of the entire group of patients. There thus seems to be a correlation between abnormal liver function tests and abdominal malignancy, particularly with hepatic metastasis, but needle biopsy is not an effective technique for the detection of liver metastasis.

938 **ANTIMICROBIAL THERAPY IN MEDICAL GASTROINTESTINAL DISEASES.** *(E.)* Riley, H. D., Jr. (U. Oklahoma Sch. Med., Oklahoma City). *Pediat. Clin. N. Amer.* 15(1):227-242, 1968.

This contribution to a symposium on antimicrobial therapy in pediatric medicine consists of a detailed review (61 refs.) of the treatment of those primary infections of the gastrointestinal tract which are amenable to antibiotic therapy. The author points out that the proper treatment of acute diarrhea must include three elements: (1) restoration of deficits of body water and electrolytes and the provision of both fluids and at least minimal amounts of calories; (2) prevention or reduction of further abnormal fluid losses; and (3) destruction of the infecting agent. He then discusses the specific antibiotics which are most useful in the various types of intestinal infection. In gastroenteritis due to pathogenic *Escherichia coli*, for example, good results have been obtained with neomycin, kanamycin, colistin, polymyxin, paromomycin, and gentamycin. The same drugs, as well as ampicillin, are generally effective against shigellosis and salmonellosis, although neomycin is contraindicated because of undesirable toxicity, and the value of any kind of antibiotic therapy in salmonella gastroenteritis is doubtful; chloramphenicol is the drug of choice in typhoid fever and probably in the other salmonelloses. Staphylococcal enteritis should be treated by a specific antibiotic, such as cephalothin, cephaloridine, vancomycin, the penicillinase-resistant penicillins or bacitracin, to which the causative organism has been shown to be susceptible. Mycotic enteritis due to *Candida albicans, Actinomyces bovis,* or *Histoplasma capsulatum* is best treated by means of mycostatin, penicillin G or amphotericin B, respectively; the latter drug is also the agent of choice against blastomycosis and coccidioidomycosis, while geotrichosis generally responds to mycostatin. A large number of drugs are available for the treatment of amebiasis, but no single agent is completely satisfactory; good results in the active form of the disease have been reported with oxytetracycline, emetine, chloroquine, and paromomycin, while the carrier state is best treated with diiodohydroxyquin or arsenicals. *Giardia lamblia* can generally be eradicated by the use of quinacrine or metronidazole, while balantidiasis can be treated satisfactorily with tetracycline.

939 **ANTIMICROBIAL THERAPY FOR SURGICAL DISEASES OF THE GASTROINTESTINAL TRACT.** *(E.)* Spencer, R. (1542 Tulane Ave., New Orleans, La.), A. M. Cotlar and I. Cohn, Jr. *Pediat. Clin. N. Amer.* 15(1):243-249, 1968.

Based on personal experience and a review of the literature (12 refs.), it is suggested that antimicrobial therapy is indicated primarily under three conditions: (1) for elective surgery on the colon (kanamycin and mycostatin by mouth and by rectum for 72 hr preoperatively); (2) for perforation of the bowel due to either trauma or gangrene (kanamycin i.p.); and (3) for questionable viability of a portion of the alimentary tract, with or without an anastomosis (intraluminal kanamycin). Antibiotics are not usually indicated for surgery on the esophagus, stomach, upper small intestine, pancreas, or biliary tree. Supportive systemic therapy with broad-spectrum antibiotics (kanamycin and penicillin i.m.) is also indicated after any surgical procedure in which there is significant soiling of the peritoneal cavity or abdominal wound. The same indications apply in all age groups, but the age of the patient has an effect on the choice of agents.

940 **ACID CLEARING FROM THE DISTAL ESOPHAGUS.** *(E.)* Booth, D. J. (Wilford Hall USAF Hosp., Lackland Air Force Base, Texas), W. T. Kemmerer and D. B. Skinner. *Arch. Surg.* 96(5):731-734, 1968.

A test is described which aids in the evaluation of gastroesophageal reflux and the ability of the distal esophagus to clear acid solutions. A multichannel catheter is inserted to a point 5 cm above the esophageal sphincter, and the pH is recorded during repeated swallowing after the instillation of 15 ml of 0.1 N HCl at a point 15 cm above the sphincter. In 21 normal volunteers (men, 17-30 yr old), the acid was cleared from the esophagus (pH increased to 6.0) in 4-10 swallows, regardless of the rate of swallowing. Clearing was also normal in 6 patients with either hiatus hernia or nonspecific abdominal pain who did not have an abnormal gastroesophageal reflux. In 13 patients with symptomatic hiatus hernia, however, from 15 to more than 40 swallows were needed to clear instilled HCl, the principal reasons being ineffective swallowing and repeated reflux of gastric contents. Similarly, in 6 patients with hiatus hernia and sufficiently severe esophagitis to require surgical treatment, 19 to more than 30 swallows were required before surgery. After surgery, 4 of the 6 required only 8-9 swallows, while 2 still required

-30+ swallows; one of these 2 also still showed evidence of
stroesophageal reflux in response to the Müller or Valsalva
aneuver, coughing, or taking a deep breath. The basic cause
ineffective clearing of the distal esophagus is unknown.

1 **LIVER SCANNING IN CLINICAL PRACTICE.** *(E.)* Horowitz, I. (Park City Hosp., Bridgeport,
nn.). *Conn. Med.* 32(4):286-292, 1968.

review of 200 consecutive liver scans, including 104 per-
rmed prior to surgery for a known primary neoplasm
trahepatic), 52 for cirrhosis, 42 for general findings of
emia, weakness, palpable abdominal masses, and jaundice,
d 2 subphrenic abscess or hepatic trauma, showed that
nning with radioactive colloidal gold (150-200 microcuries
) is useful to determine the presence of liver metastasis, in
evaluation of cirrhosis, and in patients with space-
cupying lesions inside or outside of the liver; radioiodinated
se Bengal can help in the differentiation between hepato-
lular and extrahepatic obstructive jaundice. It is particularly
portant that in liver disease, scans may become positive
fore any biochemical changes occur, although the results
st be correlated with other findings to prevent misinterpre-
ion. Among the 104 patients with a known neoplasm, 24
owed liver metastasis on the scan, and no liver metastases
re detected during surgery in any of the other 80. In
rhosis of the liver, all biopsies correlated well with the scan
gnosis; the patterns were of three types depending on the
ge of cirrhosis. However, the scan cannot distinguish be-
een postnecrotic cirrhosis due to infectious hepatitis and
vanced Laennec's cirrhosis. The safety of liver scanning
mpares well with that of other diagnostic techniques.

2 **CONTRIBUTIONS TO THE ROENTGENOLOGICAL STUDY OF ESOPHAGEAL VARICES.**
) Debau, M. (Gastroent. Cent., Bucharest, Romania),
Oproiu, S. Tacorian, E. Marinescu, M. Debau, O. Hoanca,
Russu and M. Ionescu. *Rum. Med. Rev.* (4):38-41, 1967.

dies on 12 patients with cirrhosis of the liver (accompanied
portal decompensation in 7 of 12) showed that a lunch
ntaining 90 g of protein leads to a physiological increase in
rtal pressure with consequent turgescence and enlargement
esophageal varices, facilitating their visualization by eso-
ageal x-ray. Using a right anterior oblique projection in the
rsal recumbent position, 2-3 hr after a protein lunch, varices
re revealed in many patients in whom conventional barium
amination on an empty stomach gave negative results. In
se in whom the fasting x-ray also revealed esophageal
ices, the varices after a protein lunch were more voluminous
d clearly outlined, and the esophageal contour was more
tinct.

43 **EXPERIENCES WITH INSTRUMENTAL INJURIES ON A TEACHING GASTRO-
NTEROLOGY SERVICE, 1951-1966.** *(E.)* Palmer, E. D.
A Hosp., East Orange, N. J.). *Amer. J. Gastroent.* 49(2):
26-134, 1968.

he incidence of instrumental injuries due to gastrointestinal
doscopy and biopsy procedures is discussed; the symptoms
llowing perforation, treatment, and prognosis are outlined.
Although the accident percentage was low, esophagoscopy procedures resulted in more accidents than other gastrointestinal endoscopic techniques. Good instrumentation, proper judgement as to applicability, properly trained personnel, and good technique are factors that will help to eliminate accidents during diagnostic procedures.

944 **AN ELECTRODE FOR pH MEASUREMENT IN THE GASTROINTESTINAL TRACT.** *(E.)* Rune, S. J. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroent.* 3(1):91-94, 1968.

A new electrode for measuring *in situ* gastrointestinal tract pH is described. Errors due to the varying potential differences of gastric and duodenal mucosa and the surrounding fluids are eliminated by the establishment of a KCl salt bridge in the electrode. Identification of the gastroduodenal junction can be made by measuring the potential between the reference electrode and a calomel electrode in contact with the skin. Evaluating and comparing pH recordings of different individuals is facilitated by using an electronic integrator, such as a pH averaging analog computer. *In situ* pH measurement can provide information on gastric, duodenal, and pancreatic functions which cannot be obtained by measuring aspirate pH.

945 **DETERMINANTS OF HUMAN TUMOR SENSITIVITY TO FLUORINATED PYRIMIDINE CHEMOTHERAPY.** *(E.)* Wolberg, W. H. (U. Wisconsin Med. Ctr., Madison). *Ann. Surg.* 166(4):609-622, 1967

In vitro thymidine-^{3}H and uridine-^{3}H incorporation into DNA was studied in 114 tumor specimens; the effects of 5-fluorouracil (FU) and 5-fluoro-2'-deoxyuridine (FUDR) on incorporation were evaluated. *In vitro* studies and tumor responses to chemotherapy were closely related in two-thirds of the cases. Sensitive tumors possess the pyrimidine anabolic enzymes necessary to convert FU and FUDR to 5-fluoro-2'-deoxyuridine-5'-monophosphate (FUDRP); resistant tumors lack these enzymes. Fluorinated pyrimidines block thymidine and uridine incorporation in sensitive tumors. Further studies are needed to categorize tumors with elevated thymidine uptake in the presence of fluorinated pyrimidines and which respond inconsistently to clinical chemotherapy.

946 **THE POSSIBILITY OF UNIFORM TREATMENT FOR THE INTESTINAL DISTURBANCES ACCOMPANYING COLITIC SYNDROMES (REPORT OF 220 CASES).** *(Fr.)* Wiel, R. (Paris, France). *Gaz. Med. France* 75(11):2340-2343, 1968.

Mexaforme, a synergistic combination of 200 mg of chloroiodoquin and 20 mg of phenanthroline-quinone, which is claimed to have antibacterial, antiparasitic, and antifungal activity with practically no toxicity, was used with considerable success in the treatment of 220 patients with a variety of intestinal disorders. Thus, at a dosage of 2 tablets 3 times a day for 20 days, preceded or followed (in the 78 patients with active disease) by 40 days of treatment with other amebicides, cures were obtained in 82 out of 91 cases of amebic or post-amebic colitis; 7 of the 9 failures were apparently due to drug intolerance. Prophylactic treatment at a dosage of 3 tablets/day was effective in preventing amebiasis in 6 persons visiting areas where amebiasis is endemic. In nonparasitic colitis, the dosage of Mexaforme was 4-6 tablets/day for periods of 15 days per course; at this dosage, cures were obtained in 35 out of 37 cases of infectious colitis, 9 of 10 cases of colitis in patients with dolichocolon or megacolon, 22 of 26 cases of sigmoid diverticulitis, 6 of 6 cases of ulcerohemorrhagic rectocolitis, and 41 out of 44 cases with functional disease of the large intestine (spasm, meteorism, constipation, and diarrhea without evident cause). These successes included 94 of 97 cases presenting with diarrhea and 30 of 42 cases presenting with constipation. While the effect on diarrhea is rapid (usually in 1-2 days, sometimes 4-5 days), that on constipation depends on equilibration of the intestinal flora and appears in 8-15 days. Functional gastrointestinal symptoms are usually improved in 2-8 days.

947 APPLICATION OF THE GALACTOSE TOLERANCE TEST FOR THE EARLY DIAGNOSIS OF FATTY LIVER IN HUMAN ALCOHOLICS.

(E.) Salaspuro, M. P. (3rd Dept. Med., U. Helsinki, Finland). *Scand. J. Clin. Lab. Invest.* 20(4):274-280, 1967.

Intravenous galactose tolerance tests (350 mg/kg galactose i.v.) with and without an alcohol load (300 mg/kg ethanol p.o.) were used to study the liver function in 15 healthy male volunteers (21-61 yr old) and 12 male alcoholics (33-54 yr old) whose diet had been inadequate for long periods. The chronic alcoholics were also subjected to liver biopsy and a battery of other liver function tests. The half-time for galactose in the absence of ethanol was about the same in patients (6-19 min) as in controls (8-17 min, average 12.7). In controls, however, the half-time was markedly increased by an ethanol load (to 31-53 min, average 40.0), resulting in a difference of 19-37 min (average 28.0) between the values with and without alcohol, while in the alcoholics the half-time with an alcohol load was still only 9-29 min and the difference between the values with and without alcohol was only 0-21 min (being less than 13 min in 10 of the 12 patients). There was an inverse correlation between the ratio of the alcohol-loaded and alcohol-free tests and the degree of fatty infiltration of the liver, and it is concluded that a fatty liver should always be suspected if the alcohol-induced prolongation of the galactose half-time is less than 17 min. The early stage of liver involvement in these patients is indicated by the fact that the serum bilirubin, albumin, alkaline phosphatase, and sulfobromophthalein excretion were normal in all 12; although the serum glutamic-oxaloacetic and glutamic-pyruvic transaminase were elevated in 5 of 12, the lactic dehydrogenase was elevated in 1 of 12, and the serum globulins were slightly above normal in 3 of 12, all these parameters returned to normal during the first week of hospitalization. Only 3 of these patients had lipotropic therapy, and in all 3 the galactose tolerance test with addition of alcohol was also normalized within a month. The mechanism of this test is unknown, but may be related to elevated $NADH_2$ levels in fatty liver due to a deficiency of $NADH_2$-oxidizing enzymes, as a result of which the oxidation of alcohol can no longer produce a significant increase in the $NADH_2$ level, which is normally responsible for the inhibition of galactose metabolism. The test is recommended for the early diagnosis of fatty liver.

948 BENIGN AND MALIGNANT EPITHELIAL TUMORS OF THE GASTROENTERIC TRACT: CHROMOSOME ANALYSIS IN STUDY AND DIAGNOSIS.

(E.) Messinetti, S. (Inst. Surg. Semeiot., U. Rome, Italy), G. P. Zelli, L. R. Marcellino and E. Alcini. *Cancer* 21(5): 1000-1010, 1968.

Direct chromosome analysis was carried out on cells obtained immediately after surgery from 6 patients with benign or malignant epithelial tumors of the gastrointestinal tract. In 2 patients with adenomatous polyps of the sigmoid colon, all cells examined showed 46 chromosomes and a normal diploid karyotype. In an adenomatous polyp of the pyloric antrum which was undergoing malignant transformation, however, the chromosome number varied from 45 to 106 (8/20 cells examined having 58 chromosomes); in cells with 45-47 chromosomes, the karyotype was essentially normal, but in those with 58 chromosomes, the karyotype showed loss of units in some groups, addition in other groups (particularly C_{6-12}), frequent trisomy (especially in A_1, A_3 and E_{16}), and the very frequent presence of "marker" chromosomes of the long acrocentric *d* type, the long subtelocentric *b* type or the submetacentric *a* type, as well as minute chromosomes. In a vegetating adenocarcinoma which was infiltrating the pyloric antrum, the chromosome number varied from 48 (in 8 of 11 cells) to 106, and the karyotype was abnormal in every case; the principal abnormalities were loss of units in A_3 and B_5, additions in A_1, A_2 and C_{6-12}, and the presence of marker chromosomes. In a vegetating adenocarcinoma of the left colon which had developed from an adenomatous polyp, the chromosome number varied from 46 to 105; cells with 46 chromosomes showed a normal karyotype, while those with 60 showed various abnormalities, mostly consisting of additions in A_3, B_{4-5}, C_{6-12} and E_{16-18}; it is postulated that the cells with normal chromosome number were derived from adenomatous tissue which had not yet undergone malignant transformation. Finally, an adenocarcinoma of the rectosigmoid junction showed a chromosome number of 74-119 (6 of 11 cells examined had 78 chromosomes) and karyotypic abnormalities consisting of trisomy, additions, and the presence of marker chromosomes. There was no relationship between the chromosomal alterations and the site, type, or degree of malignancy of the tumors. There is also no evidence as to whether the karyotypic abnormalities are the cause or the effect of the malignant transformation. However, analysis of the karyotype may be useful in the differential diagnosis of benign and malignant gastrointestinal tumors.

949 METHEMALBUMIN IN THE DIAGNOSIS OF ACUTE PANCREATITIS.

(E.) Joseph, W. L. (UCLA Sch. Med., Los Angeles, Calif.), G. H. Stevens and W. P. Longmire, Jr. *J. Surg. Res.* 8(5):206-210, 1968.

In 10 dogs in which acute hemorrhagic pancreatitis had been produced by instillation of bile plus trypsin into the ligated main pancreatic duct (method of Elliott et al., *Ann. Surg.* 146:669, 1957), simultaneous determinations of blood amylase and methemalbumin revealed moderate increases in serum amylase (to 1,000-2,000 U 12-36 hr postoperatively) and a pronounced increase in methemalbumin (to 59-115 mg% beginning approximately 18 hr after the operation and emaining high for as long as 3 days). There were no in-reases in either serum amylase or methemalbumin in 5 dogs ubjected to simple laparotomy (normal levels of 150-1,000 J and 4.0-8.0 mg%, respectively). In 20 dogs subjected to ther types of surgery (perforation or obstruction of the mall intestine, ligation of the superior mesenteric vein, and cute peritonitis), the serum amylase increased to 1,000-1,500 J 12-36 hr postoperatively, but there was no increase in nethemalbumin. The determination of methemalbumin, the esult of the digestion of hemoglobin by locally liberated ancreatic enzymes, thus represents a convenient and accurate nethod for the differential diagnosis of acute abdomen.

50 **THE CLINICAL VALUE OF THE ESOPHAGEAL ACID PERFUSION TEST IN PATIENTS WITH HEST PAIN.** *(E.)* Estaba, V. (VA Hosp., Clarksburg, W. Va.), I. Franklin and M. H. Floch. *Conn. Med.* 32(3):211-213, 1968.

he results of the acid perfusion test (instillation of saline, 0.1 HCl and then again saline at a rate of 100-120 drops/min or 15-30 min to a point in the esophagus 33-35 cm from the ps) were compared with those of electrocardiography, upper astrointestinal barium X-ray, and (in 4 cases) selective coronary rteriography or esophagoscopy in 4 asymptomatic volunteers nd 16 patients (9 men and 7 women, 44-75 yr old) with etrosternal and precordial pain in order to evaluate the useful-ess of esophageal acid perfusion in the differential diagnosis f reflux esophagitis and coronary artery disease. The acid erfusion test was positive in 5 patients, all of whom were hown by X-ray to have hiatus hernia and esophagitis; the pre-enting symptoms in these 5 patients were heartburn (in 4 of) and dull substernal pain (in 2 of 5). One of the 5 also howed a drop in esophageal pH after straining (acid reflux), nd one showed electrocardiographic signs of an old myocardial nfarction. Among the 11 patients with negative acid perfusion ests, presenting with epigastric pain (3 cases), dysphagia (3 ases), heartburn (2 cases), substernal pain (2 cases) and/or recordial pain (2 cases), radiology revealed 4 cases of hiatus ernia, 3 with esophageal constriction (one with a positive iopsy for carcinoma), and one diverticulum. One of these 11 lso had acid reflux plus hiatus hernia, despite the negative cid perfusion test, and 4 others had evidence of active myo-ardial disease. Of the other 3 patients with hiatus hernias and egative acid perfusion tests, 2 had epigastric pain and one resented with precordial pain due to heart disease. It is oncluded that a positive acid perfusion test is a helpful guide n the diagnosis of reflux esophagitis.

51 **SUITABILITY OF POLYETHYLENE GLYCOL AS A DILUTION INDICATOR IN THE HUMAN OLON.** *(E.)* Shields, R. (Welsh Natl. Sch. Med., Cardiff, Vales), J. Harris and M. W. Davies. *Gastroenterology* 54(3): 31-333, 1968.

modification of the technique of colonic perfusion described y Levitan et al. was employed to measure the rates of net ransport and of unidirectional flux of sodium, potassium, and vater in healthy and diseased colon. After preliminary irriga-ion, the colon was perfused with Tyrode's solution which con-ained 1% of polyethylene glycol 4000 and the radioactive and table isotopes of sodium, potassium, and water, at a rate of 5 ml/min for from 90-180 min. In 8 studies in 6 healthy subjects and in 11 studies in patients with various diseases (including 7 with ulcerative colitis) analysis of the rectal effluent indicated virtually 100% recovery of the polyethylene glycol.

952 **ANGIOGRAPHIC DEMONSTRATION OF THE BLEEDING SITE IN ACUTE GASTROINTESTINAL HEMORRHAGE.** *(E.)* Cornell, S. H. (U. Iowa Coll. Med., Iowa City). *J. Iowa Med. Soc.* 58(4):364-369, 1968.

A technique is presented for the angiographic demonstration of the site of bleeding which depends on the fact that there is actual bleeding into the gastrointestinal tract. A radiopaque, precurved catheter under fluoroscopic guidance is inserted into a suspected vessel and then a bolus of radiopaque material is injected rapidly. A series of rapid angiograms is taken covering a period of about 15 sec. First the celiac artery is investigated followed by the superior mesenteric artery. These plates are then examined for evidence of extravasation of the material into a hollow viscus. If there is no evidence of bleeding, similar studies are performed with the inferior mesenteric artery. The amount of contrast medium employed depends on the size of the vessel and may vary from 10-30 ml.

953 **CHLORDIAZEPOXIDE-CLIDINIUM BROMIDE IN GASTROINTESTINAL DISORDERS: CONTROLLED CLINICAL STUDIES.** *(E.)* McHardy, G. (Louisiana State U. Sch. Med., New Orleans), D. Sekinger, L. Balart and H. E. Cradic. *Gastroenterology* 54(4):508-513, 1968.

A double-blind study of basal gastric secretion in 19 patients (14 men and 5 women, 24-69 yr old) with active duodenal ulcers and hypersecretion showed that Librax (10 mg chlordiazepoxide + 5 mg clidinium bromide 4 times daily for 3 days p.o.) produced a significant decrease in the volume of gastric secretion (from 209.4 ml on placebo to 77 ml average on the drug), an increase in gastric pH (from 1.3 on placebo to 2.8), and a decrease in the concentration of HCl (from 64.9 mEq/liter on placebo to 27.8 mEq/liter). The only side effect reported was mild dryness of the mouth. Among 34 other patients (12 men and 22 women) with a history of chronic functional gastrointestinal disease for 4 years or longer, a double-blind cross-over study revealed good to excellent improvement in abdominal pain, nausea, heartburn, diarrhea and/or flatulence in 24 cases during drug therapy (5 mg chlordiazepoxide + 2.5 mg clidinium bromide 4 times daily for 3 weeks) and in 12 cases during placebo therapy. The 24 who responded included 10 of 17 given the drug first and then a placebo, and 14 of 17 given a placebo first and then the drug; there were 6 placebo-reactors in each group. Side effects (drowsiness, xerostomia, constipation, blurring of vision) were reported 63 times by patients on the drug and 34 times by patients on placebo. The interaction between psychological and physiological factors in the causation of gastrointestinal disease is discussed.

954 **CONTRIBUTIONS OF INTRAVENOUS CHOLANGIOCHOLECYSTOGRAPHY TO THE PROBLEM OF SATELLITE HEPATITIS.** *(Rom.)* Dimitrescu, I. (2nd Med. Clin., Cluj, Romania), T. Fekete, E. Grecu and A. Giurgiu. *Med. Intern. (Bucur.)* 20(3):355-360, 1968.

The urinary excretion of contrast medium during i.v. cholangiocholecystography was investigated in order to evaluate the excretory function of the liver in patients with cholelithiasis. The results showed a relation between the urinary excretion and the opacification of the extrahepatic bile ducts. It is therefore suggested that the transitory negativity of i.v. cholangiocholecystography following biliary colic, which is associated with increased urinary excretion of contrast medium, is due to the presence of parenchymal liver damage. Four illustrative cases (1 man and 3 women, 43-51 yr old) are presented in which biliary (3 cases) or renal (1 case) colic was followed by lack of visualization of the biliary tree. The urinary excretion of contrast medium in a 5-hr period in these patients was 2183-3455 mg. After periods ranging from 5 days to 2 months, cholangiocholecystography became positive and the amount of contrast medium excreted in the urine in 5 hr had decreased to 1473-2095 mg. In view of the existence of parenchymal damage, the term "satellite hepatopathy" is suggested as being more suitable than "satellite hepatitis" to refer to the liver dysfunction accompanying diseases of the gallbladder.

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956 **A TOILET MONITOR FOR MEASUREMENT OF ^{51}Cr TAGGED ERYTHROCYTE EXCRETION. [ORAL COMMUNICATION; 40TH ANNUAL MEETING, CENTRAL SOC. CLIN. RES.]** *(E.)* Paustian, F. F. (Omaha, Neb.), H. M. Lemon, D. B. Haack, D. V. Passer and F. L. Dunn. *J. Lab. Clin. Med.* 70(5):890-891, 1967.

957 **DETECTION OF SCHISTOSOME OVA BY FLUORESCENCE MICROSCOPY. [ORAL COMMUNICATION; 40TH ANNUAL MEETING, CENTRAL SOC. CLIN. RES.]** *(E.)* Domingo, M. (Chicago, Ill.), R. F. Mais, R. Weiskopf and S. Fink. *J. Lab. Clin. Med.* 70(5):865-866, 1967.

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1004 **COMPARED RESULTS OF TOTAL AND SELECTIVE VAGOTOMY IN THE TREATMENT OF DUODENAL ULCER, IN A SERIES OF 98 CASES.** *(Fr.)* D'Huart, F. (Luxembourg). *Ann. Chir.* 22(3-4):155-158, 1968.

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1007 **STUDIES ON GASTROPHOTOGRAPHY IN STOMACH BY POSITIONAL CHANGE REPORT 3. GASTROPHOTOGRAPHY IN RESECTED STOMACH.** *(Jap.)* Mayake, T. (Tenri Hosp., Tenri City, Nara) Y. Yamamoto, T. Suzaki, J. Ariyoshi, Y. Yagiri, K. Hajiro, A. Miyoshi, and M. Watanabe. *J. Arch. Intern. Med.* 14(11,12):309-316, 1968.

1008 **THE RATIONAL SELECTION OF LIVER FUNCTION TESTS.** *(E.)* Mackay, J. S. (Sch. Hyg., U. Toronto). *Appl. Ther.* 10(4):257-261, 1968.

1009 **A SYSTEM OF LABORATORY TESTS FOR DIFFERENTIAL DIAGNOSIS OF JAUNDICE.** *(E.)* Gorzkowski, E. (Pomeranian Med. Acad., Szczecin) H. Szymanska, A. Nieczajew, and H. Mysliwicz-Rychlik. *Pol. Med. J.* 6(6):1496-1501, 1967.

1010 **COMBINED LAPAROSCOPY AND RADIOIODINATED ROSE BENGAL LIVER PHOTOSCAN IN THE DIAGNOSIS OF LIVER DISEASE.** *(E.)* Schuman, B. M. (Henry Ford Hosp., Detroit, Mich.) and W. S. Hauvrich. *Gastrointestinal Endoscopy* 14(3):140-141, 1968.

1011 **VISUALIZING VARICES WITH THE AID OF A RED FILTER.** *(E.)* Barancik, H. (San Francisco, Calif.) *Gastrointestinal Endoscopy* 14(3):142-143 1968.

1012 **METHODS OF INDIRECT SEROLOGICAL ANALYSIS IN THE DIAGNOSIS OF DYSENTERY.** *(Rus.)* Shmuter, L. M. (Hosp. No. 12, Khar'kov, USSR). *Sovet. Med.* (2):75-88, 1968.

1013 **RADIOLOGY OF THE DUODENUM.** *(E.)* Harper, Kemp R. A. (St. Bartholomew's Hosp., London, England). London, Lloyd-Luke Ltd., 1967.

1014 **ESTIMATION OF GASTRIC ACIDITY BY X-RAY.** *(E.)* Kleeburg, J. J. (Rothschild Munic. Hosp., Haifa). *Israel J. Med. Sci.* 4(1):149-152, 1968.

1015 **ELECTRON MICROSCOPY IN THE DIAGNOSTICS OF LIVER DISEASES.** *(E.)* Satler, J. (Med. Fac., U. Ljubljana, Yugoslavia). *Acta Hepatosplen.* 15(2):72-77, 1968.

1016 **PYREXIA AND ELEVATED ERYTHROCYTE SEDIMENTATION RATE IN ACUTE GASTRODUODENAL HAEMORRHAGE.** *(E.)* Chapman, R. S. (Roy. Infirm., Aberdeen, Scotland) and S. D. Mohamed. *Postgrad. Med. J.* 44(509):238-241, 1968.

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1017 UROLOGIC COMPLICATIONS OF ABDOMINOPERINEAL SURGERY. *(E.)* Goldfarb, M. (Meadowbrook Hosp., East Meadow, N. Y.) and R. Medina-Cue. *Dis. Colon Rectum* 10(5):379-383, 1967.

Abdominoperineal resection (the "Miles" operation) was performed on 52 consecutive patients for treatment of carcinoma of the sigmoid flexure or rectum. Patients ranged in age from 17-87 yr; most were in the sixth decade; 18 were women and 34 were men. There were 2 postoperative deaths. Incidence of urologic complications was 74%, a rate higher than in 2 other series which were used for comparison (Memorial Hospital in New York, and the University of Colorado). In the authors' series, urologic complications included injuries to the ureter, bladder prostate, and urethra. There also was severe and persistent infection of the bladder; perineocutaneous, ureteroperineal, and vesicovaginal fistulas; and bladder dysfunction, either urinary retention or incontinence of urine.

1018 SCHISTOSOMIASIS AS A WORLD PROBLEM. *(E.)* Wright, W. H. (Lab. Tropical Dis., NIH, Bethesda, Md.). *Bull. N. Y. Acad. Med.* 44(3):301-312, 1968.

A survey is presented of the geographical distribution, prevalence, intensity of infection, morbidity and mortality, transmission patterns, and economic impact of schistosomiasis. Although prevalence rates are variable depending on transmission patterns, schistosomiasis is known to be endemic in 72 countries or islands with a total population of about 1,348 million, of whom 354.3 million are exposed to the disease and 117.9 million are infected. The estimated number of persons exposed in Africa was 187.5 million out of a total of 301.7 million, while 74.3 million were infected; in comparison, in the Mascarene Islands, of 5.47 million exposed out of a 7.16 million population, 677,000 were infected. In Southwest Asia, 9.97 million are exposed and 3.23 million infected out of a total population of 84.38 million. The countries of the Orient, in which *Schistosoma japonicum* is known to occur, have a total population of 857.8 million, with 101.9 million exposed and 33.3 million infected. *S. mansoni* is believed to be spreading in the Americas with 49.4 million exposed and 6.3 million infected out of a total population of 97.0 million. Due to inadequacy of reporting, true morbidity and mortality figures are lacking. The economic impact of the disease is illustrated by figures from Egypt where it is estimated that 1.5 million individuals are permanently disabled from the disease. The annual monetary loss for Africa as whole from the disease is approximately 212 million dollars.

1019 PAROMOMYCIN IN THE TREATMENT OF INTESTINAL AMEBIASIS; A SHORT COURSE OF THERAPY. *(E.)* Simon, M. (Montefiore Hosp., Bronx, N. Y.), H. B. Shookhoff, H. Terner, B. Weingarten and J. G. Parker. *Amer. J. Gastroent.* 48(6):504-511, 1967.

Of patients infected with either *Entamoeba histolytica* or *Dientamoeba fragilis* or both, treatment with paromomycin (1.75 g/day) for 2-5 days was effective (negative stools) in 49 of 55 given a complete follow-up, while treatment with 4 g for 1 day was effective in 15 of 21. Follow-up was complete when 3 separate stool examinations were negative or when any post-treatment stool examination revealed the parasites. A control tetracycline (1 g for 10 days) group showed a high percentage of failures. Side effects from paramomycin included nausea, dizziness, headache, urticaria, heartburn, cramps or bloating; diarrhea occurred in 15% of the patients. No adverse effects were reported by the patients taking the one-day treatment. The study suggests that a 2 day course of treatment is as effective as a 5 day course. Against *D. fragilis*, a 4 or 5 day treatment was more effective that one for 2 or 3 days since *D. fragilis* is more resistant to antiamebic drugs.

1020 RE-EVALUATION OF METHOTREXATE AS AN ANTICANCER DRUG. *(E.)* Sullivan, R. D. (Lahey Clinic, Boston, Mass.), E. Miller, W. Z. Zurek, R. A. Oberfield and Y. Ojima. *Surg. Gynec. Obstet.* 125(4):819-824, 1967.

In patients with solid tumors, methotrexate was administered orally in a daily dose of 5 mg given in 4 divided doses, or by continuous i.v. infusion in a daily dose of 5 mg/24 hr. These dose schedules yielded maximal clinical benefit with acceptable toxicity. In 161 patients with disseminated forms of cancer, tumor regression with associated clinical benefit was noted in 30%. Neoplasms showing response included cancer of the head and neck, of the gastrointestinal tract (17 colorectum, 11 each pancreas and bile duct, and stomach and esophagus), and of the ovary, and miscellaneous carcinomas and sarcomas. Duration of remission varied from 2-15 months and averaged 4.4 months.

1021 HISTOCHEMICAL AND BIOCHEMICAL STUDIES ON A PANCREATIC TUMOR FROM A PATIENT WITH THE ZOLLINGER-ELLISON SYNDROME. *(Ger.)* Schmidt, H. A. (Med. Clin., U. Marburg/Lahn, Germany), E. O. Riecken, H. Goebell, W. Dolle and G. A. Martini. *Klin. Wschr.* 45(23):1180-1188, 1967.

The case history of a 60-yr-old man who died of biliary peritonitis following pancreatectomy and gastroduodenectomy for a non-β-cell islet tumor of the pancreas, complicated by hiatus hernia, gastric and esophageal ulcers and gastric hypersecretion (Zollinger-Ellison syndrome), is followed by a report of detailed pharmacological, histochemical and biochemical studies on the tumor and normal pancreatic tissue. Pharmacological assay in the cat, for example, revealed that the tumor produced gastrin. Histochemical studies revealed large extracellular globules containing mucopolysaccharides, proteins and lysosomal enzymes among cords of tumor cells separated by connective tissue. These granules apparently contained secretory material with endocrine qualities, which may have been the source of the gastrin activity. Comparative biochemical assays of the tumor tissue and normal pancreatic tissue confirmed the histochemical findings and revealed a 5-fold increase in glycolytic enzyme activity in the tumor; acid phosphatase and ribonuclease levels were also increased, although the nucleic acid content was significantly lower than normal (normal DNA/RNA ratio). An unusual finding was the very high level of glycerophosphate dehydrogenase in the tumor tissue.

1022 A REVIEW OF 144 CASES OF TRANSDUODENAL PAPILLO-SPHINCTEROTOMY. *(It.)* Pasquali, E.

(S. M. dei Battuti, Munic. Hosp., Conegliano, Italy). *Chir. Gastroent.* 1(3):378-391, 1967.

During the period 1960-66, transduodenal papillo-sphincterotomy was performed in 144 cases (13 men and 131 women, most between 40 and 70 yr of age), including 85 with intrahepatic lithiasis (sometimes combined with papillary stenosis), 41 with primary disease of the papilla or sphincter of Oddi, 14 with pain following cholecystectomy, and 4 with chronic pancreatitis; 3 of the patients with lithiasis were treated on an emergency basis, and 4 were treated simultaneously for peptic ulcer. There were no deaths and no postoperative complications. Follow-up examination in 61 of the 75 patients treated between 1960 and 1964 revealed very good or excellent results in 85%, moderate improvement in 12%, and a complete recurrence in 3% (2 cases). The indications, diagnostic criteria and technique of the operation are briefly discussed.

1023 SURGICAL ASPECTS OF INGUINOCRURAL HERNIA. *(Sp.)* Barreiro Alvarez, F. (La Paz Soc. Sec. Clin., Madrid, Spain), A. Mateo Martinez and J. I. Marariños Ramon. *Rev. Esp. Enferm. Apar. Dig.* 27(1):81-105, 1968.

The surgical techniques for the repair of inguinocrural hernia are reviewed and discussed in considerable detail, beginning with the incision of Nyhus (as modified by Fruchaud) and going on to the various techniques for the reconstruction of the abdominal wall, eight of which are illustrated (techniques of Hackenbruch, Girard, Squirru-Finocchetto, Forgue-Fergusson, Kirschner, Andrews II - Wise, Lotheissen, and Bassini). The point is made that hernia surgery can be classified broadly into 1) operations which involve surgery on the hernial sac; 2) conservative procedures such as simple herniotomy, anulorrhaphy to anulosuspension; and 3) herniorrhaphy or hernioplasty. In their personal experience with 144 cases of inguinal and 56 cases of crural hernia, the authors used the technique of Lotheissen in 59.72% and 96.43% (54 cases), resp. The other two crural hernias were operated on by the crural route, while among the inguinal hernias, 38.88% were treated by the Bassini technique, 5.55% (8 cases) by the Barker method, and 1.4% (2 cases) by the technique of Forgue. As usual, inguinal hernia was much more common among the males, and crural hernia among the females; 8 of the inguinal hernias were congenital. The hernial sac was empty in 68% of the patients with inguinal hernia and 32% of those with crural hernia, while in 10 and 38%, resp., it contained epiploon and in 18 and 30%, resp., it contained a loop of intestine. Strangulation was encountered in about half of the crural hernias and one quarter of the inguinal hernias, but in most cases (50 of 64) the duration of strangulation was 24 hr or less. Results were comparable to those in the literature. Complications included one case in which the femoral vein was accidentally cut and one case each of thromboembolism, postoperative pneumonia, and diaphragmatic hernia. The importance of high ligature of the hernial sac and firm reconstruction of the posterior wall of the inguinal canal with a nonabsorbable material is emphasized.

1024 CLINICAL EXPERIENCE WITH THE ASSOCIATION OF GASTROINTESTINAL DISEASES AND EMOTIONAL DISORDERS. *(Sp.)* Sallent Herranz, J. A. (Aznar Bros. Outpat. Clin., Natl. Inst. Forecasting, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 27(1):106-112, 1968.

Nortriptylin (Paxtibi; 30-75 mg/day for 2 months) was given to 30 patients (11 men and 19 women; 18-67 yr old, mostly between 20 and 40) presenting with anxiety or depression and a variety of gastrointestinal diseases. This anticholinergic agent was used together with the usual somatic therapy for the gastrointestinal disorder, at a dosage of 25 mg three times a day for 24 patients and 10 mg three times a day for 6 patients (3 of these having been started at the lower dosage and 3 placed on it after complaining of side effects). "Good" (13 cases) or "excellent" (13 cases) results were obtained in all 11 cases of gastritis plus anxiety (7) or depression (4), in all 4 cases of duodenal ulcer (2 with anxiety and 2 with depression), in 4 or 5 cases of choledyskinesia, in 2 of 3 cases of ulcerative colitis, and in individual cases of duodenal diverticulosis, regional ileitis, pancreatitis, sialorrhea, and aerocolia plus dystonia. "Excellent" results were obtained in 9 of 18 cases with anxiety and in 4 of 12 cases with depression, and the only two patients who showed no response at all were an anxious patient with chronic hepatitis and a depressed patient with ulcerative colitis. No side effects were encountered in 13 cases, and in the others, effects such as somnolence, dry mouth, bad taste, nausea, dizziness, headache, insomnia, weakness, abdominal pain and palpitations tended to disappear with time. There was no effect on gastric secretion, blood chemistry, or liver and kidney function. In view of its anticholinergic effects, however, nortriptylin is contraindicated in prostatic hypertrophy, glaucoma, or patients receiving sympathicomimetic drugs or MAO inhibitors.

1025 EFFECTIVENESS OF PROTEIN HYDROLYSATES AND THEIR INFLUENCE UPON PROTEIN-NITROGEN METABOLISM IN SOME DISEASES OF THE GASTROINTESTINAL TRACT. *(Rus.)* Atakhanov, E. I. (Tashkent Med. Inst., USSR) and K. Iu. Iuldashev. *Sovet. Med.* (2):54-58, 1968.

A controlled study of protein hydrolysate TsOLIPK, Hydrolysin L-103 and Aminopeptide-2, in comparison with homogeneous plasma, was carried out in 228 patients (most 20-50 yr old) with chronic enteritis (63 cases), colitis (50 cases), peptic ulcer (95 cases) or post-gastrectomy syndromes (20 cases) of 2-20 yr duration. In addition to a weight loss of 1-15 kg in 143 of these patients and hypoproteinemia in 153, 68 showed signs of secondary hepatitis and many showed edema and other signs of a disruption in nitrogen metabolism (increased excretion of ammonia). Protein hydrolysate was given to 120 patients at a dosage of 200-500 ml every 2 days i.v. (6-10 injections per course); 51 others received infusions of homogeneous plasma (100-200 ml) by way of control. As a result of protein therapy, the general condition and appetite improved, the patients gained weight, pain, dyspepsia and diarrhea decreased, anemia was alleviated, the total serum protein increased from an average of 5.54 g% to 6.64 g% (an increase of 1.0 g% on protein therapy compared to 0.9 g% on plasma and 0.39 g% in controls), and the nonprotein nitrogen decreased from 33.4 to 23.3 mg% (a decrease of 10 mg% compared to 9 mg% on plasma and 8 mg% in controls). The point is made that TsOLIPK has more of the essential amino acids than other types of protein therapy, that it does not produce transfusion reactions, and that it is convenient to store and use and inexpensive to produce. All three protein preparations are highly recommended as supportive therapy in patients with chronic gastrointestinal disease accompanied by hypoproteinemia and other signs of protein deficiency.

1026 A REPORT OF 80 CASES OF CHRONIC ALIMENTARY DIGESTIVE ALLERGY. *(Fr.)* Bernard, J. G. (Milit. Balneol. Hosp., Vichy, France). *Acta Gastroent. Belg.* 30(5/6):407-426, 1967.

Most functional disorders of the digestive tract are accompanied by some type of intolerance to food, often appearing as the late result of viral hepatitis or amebiasis and sometimes as a recurrence of a childhood nutritional disorder. A particular variety of food intolerance is chronic alimentary digestive allergy (CADA), the proper diagnosis and treatment of which must be based on dietary exclusion tests such as proposed by Rinkel. Many patients, however, refuse such tests for psychological reasons, as a result of which the CADA syndrome, which is defined and discussed at length in the present paper, must be diagnosed on the basis of the patient's general clinical characteristics. Among 250 patients (217 men and 33 women, most over 50 yr old and most ex-soldiers with a history of foreign service) treated for digestive disorders at the Vichy Hospital, e.g., more than 50% refused to take part in diagnostic tests since they felt themselves to be improved sufficiently by balneological therapy. These patients, with symptoms such as dyspepsia (71%), hepatobiliary disorders (33%) and colitis (19%), had a duration of illness of over 10 yr, and half of them had had more than 3 courses of treatment at Vichy; 50% had a history of amebiasis, 33% had had viral hepatitis, and 20% reported childhood digestive disorders. The patients themselves blamed their symptoms on the ingestion of fats and sauces (96%), eggs (31%), starches and cereals (30%), alcohol (20%), milk (17%), chocolate and other items, as a result of which some were on a seriously unbalanced diet. The allergic nature of the condition was indicated by a personal or family history of allergy in 67% and by current symptoms of an allergic nature (asthma, urticaria, migraine, asthenia, insomnia, muscle pain) in 61%. On the basis of an overall evaluation of the clinical picture of CADA, it is concluded that 11.8% of these patients had a definite CADA syndrome, another 36% a probable CADA syndrome, 9.6% a fixed food allergy of another type, 7.6% a primarily nondigestive allergy, and 24% a simple food intolerance of a nonallergic nature. The Rinkel dietary exclusion test (the technique and rationale for which are described) was then carried out in 80 of these patients (74 men and 6 women), the others having been eliminated either at their own request, because their symptoms were generally mild, or because of other psychological or clinical factors. Tests to 6 allergens revealed 59 positive cases, 7 doubtful cases and 14 who gave negative results to all 6 allergens; 23 of the 80 patients were allergic to one food, 19 were allergic to 2 foods, 15 to 3 foods and 2 to 4 foods. The six incriminated foods were: wheat flour (29 cases), potatoes or other solanaceous plants (28 cases), eggs (17 cases), milk (8 cases), pork (8 cases), and roughage (3 cases); it is pointed out that the first two (wheat flour and potatoes) were never blamed by the patients themselves, while milk and eggs tended to be blamed too often. A one-yr follow-up of 18 of these patients showed that 11 of the 14 who adhered to the restricted diet were cured, while 2 of the other 4 showed partial improvement as the result of other therapy.

1027 CLINICO-MORPHOLOGICAL PARALLELS IN PATIENTS WITH CHRONIC ENTEROCOLITIS. *(Rus.)* Savoshchenko, I. S. (Inst. Nutrit., Acad. Med. Sci. USSR, Moscow), M. M. Gurvich and N. B. Shalygina. *Sovet. Med.* (2):15-21, 1968.

The results of aspiration biopsy of mucosa from the stomach (27 cases), small intestine (17 cases) and sigmoid colon (19 cases) were compared with clinical, radiological and laboratory findings in 30 patients (10 males and 20 females, most 21-40 yr old) with chronic enterocolitis. The enterocolitis was of 7-10 yr duration or longer in 20 of 30, and was ascribed to dysentery in 15 cases, protein deficiency in 11, and a mixed etiology in 4. On the basis of symptoms such as weight loss (23 cases), diarrhea (21 cases), hypoalbuminemia (19), hypocalcemia (11), hypoproteinemia (5), radiological signs of disturbed motility (25), achlorhydria (11), radiologically detectable changes in the mucosa of the small (11) or large (22) intestine, and the signs of subatrophic or atrophic rectosigmoiditis (24 cases) or catarrhal rectosigmoiditis (6 cases) revealed by rectoromanoscopy, the patients were divided into three groups: 19 with mild and inconsistent symptoms, 8 with intermediate symptoms, and 3 with severe symptoms and definite impairment of the general condition. Among the mildly ill patients of the first group, the small intestinal mucosa was normal in 4 of 9, but the large intestinal and gastric mucosa showed atrophy in 4 of 4 and 17 of 17 cases, resp.; one of the 17 biopsy specimens showed intestinal metaplasia in the gastric mucosa. Among the patients of the second group, early atrophic changes were detected in the mucosa of the small intestine in 4 of 5 cases, the sigmoid in 2 of 2 cases, and the stomach in 8 of 8 cases, and one of these 8 showed intestinal metaplasia. All three patients of the last group showed complete atrophy of the small intestinal mucosa, with transformation to a large intestinal structure; biopsy samples could not be obtained from the large intestine. The gastric mucosa, however, was normal in one case. It thus seems that the entire digestive tract is affected in chronic enterocolitis, particularly the mucosa of the stomach and large intestine. Although there is a tendency for increasing clinical severity to be accompanied by intensification of the atrophic process in the intestinal mucosa, many cases show a lack of correlation between clinical and histological findings, and the radiological and histological findings rarely agree.

1028 EMERGENCY ABDOMINAL SURGERY IN THE ELDERLY PATIENT: CLINICO-STATISTICAL CONSIDERATIONS ON 225 CASES. *(It.)* Rossi, W. (Fatebenefratelli-Fatebenesorelle Hosp., Ciceri-Agnese, Milan, Italy), M. De Vecchi Pellati and A. G. Barbieri. *Chir. Ital.* 19(1):59-74, 1967.

The 225 elderly patients (102 men and 123 women, most 70-80 yr old but including 39 who were over 80) who required emergency abdominal surgery during the period 1959-65 included 104 who were treated for strangulated hernia (50 inguinal, 47 crural, 3 umbilical, and 4 with laparocele), 47 with acute appendicitis, 31 with intestinal obstruction, 10 with peritonitis due to intestinal perforation, 13 treated for diseases of the biliary tract, 16 treated for perforated peptic ulcer, stomach cancer, or pyloric stenosis, 3 with mesenteric infarction, and 1 with an ovarian cyst. Almost half (95 cases) were operated on under local procaine anesthesia, and the overall mortality was 20%. As expected, the mortality tended to increase with age (from 18.6% among those between 70 and 75 to 28.57% among those between 81 and 85) and was highest (31.7%) among those treated for intestinal obstruction or perforation. Hernia operations generally had a low mortality (13.46%), although 3 of 4 women operated on for strangulated laparocele died, as did 2 of 3 cases with mesenteric infarction. The mortality from acute appendicitis was 18%, possibly because 31 of these 47 cases presented with a perforated appendix and diffuse peritonitis. The most common causes of death were heart failure (22 cases) and shock (10 cases), followed by pulmonary embolism, hepatorenal insufficiency, myocardial infarction, and cerebral embolism. Other postoperative complications included bronchopulmonary infections, infections of the surgical wound, cerebral thrombosis, and thrombosis of the lower extremities.

1029 A CLINICAL CONTRIBUTION TO PRIMARY LYMPHOSARCOMA OF THE COLON AND THE SMALL INTESTINE. *(It.)* Barbieri, A. G. (Fatebenefratelli-Fatebenesorelle Hosp., Ciceri-Agnesi, Milan, Italy), W. Rossi and M. De Vecchi Pellati. *Chir. Ital.* 19(2):170-180, 1967.

The histology, pathogenesis, clinical characteristics, prognosis, and therapy of intestinal lymphosarcoma are discussed on the basis of the literature and of 3 personal cases. Two of these patients (59-yr-old woman and 38-yr-old man) had tumors of the ascending colon and were treated successfully by right hemicolectomy plus isoperistaltic ileotransversostomy. The woman was well at 12 months, while the man had a local recurrence at 13 months which was treated with cyclophosphamide. The third case was that of a 29-yr-old woman with jejunal lymphosarcoma who presented with an acute abdomen due to perforation; jejunectomy was followed by a recurrence in 4 months. In general, however, the prognosis is better than that of intestinal carcinoma, with an overall cure rate of 25-40%. This is particularly true if therapy, by means of surgery, radiation, and/or cytostatic agents, is begun as soon as the malignancy of an intestinal lymphoma has been established. The clinical symptoms are those of carcinoma or other tumors, with chronic intermittent obstruction, weight loss, anemia, and fever; hemorrhage is not common. Histologically, lymphosarcoma can be distinguished from reticulosarcoma, Brill-Symmers disease, and Hodgkin's disease by the small spheroidal cells in various stages of maturation, with numerous atypical mitoses, a moderate cytoplasmic halo, and a large roundish nucleus with frequent nucleoli. The tumor arises in the submucosal lymphatic tissue and can appear in 4 variants: polypoid or nodular, infiltrative, ulcerative, and aneurismatic diverticular. Metastasis is relatively rare.

1030 GASTROINTESTINAL BLEEDING AND SALICYLATES: A COMPARATIVE STUDY OF ACETYLSALICYLIC ACID AND SALICYLSALICYLIC ACID. *(Sw.)* Thune, S. (Hosp. Rheum. Dis., Oskarström, Sweden). *Nord. Med.* 79(11):352-354, 1968.

On the basis of the benzidine test for occult fecal blood, gastrointestinal bleeding was significantly more frequent among 11 patients (6 men and 5 women, 19-79 yr old, average 54) given acetylsalicylic acid (2 tablets 3 times daily = 3 g/day) than among 11 patients (3 men and 8 women, 36-67 yr old, average 58) given salicylsalicylic acid (Nobacid) at the same dosage for rheumatic pain. In fact, only 3 patients in the Nobacid group showed any bleeding, and this only during the first 4 days, while the aspirin group showed an increasing incidence of bleeding which involved all 11 patients after 6 days of treatment. There were no subjective side effects in either group, and the therapeutic effect was not evaluated. Th results are tentatively ascribed to the fact that salicylsalicylic acid is practically insoluble in water or gastric juice, but is readily soluble in the alkaline intestinal juices.

1031 MORPHOLOGIC CHARACTERISTICS AND NUCLEIC ACID TYPE OF TRANSMISSIBLE GASTROENTERITIS VIRUS OF PIGS. *(E.)* Witte, K. H. Dept. Vet. Sci., U. Wisconsin, Madison), M. Tajima and B. C. Easterday. *Arch. Ges. Virusforsch.* 23(1/2):53-70, 1968.

The morphology and development of the Purdue strain of transmissible gastroenteritis (TGE) virus of pigs, passaged 144 times in fetal pig kidney, were studied under the electron microscope. Using the negative contrast technique, characteristic particles were found in preparations concentrated and partially purified either from infected fetal pig kidney cell cultures by phase partition in dextran-methylcellulose and dextran polyethylene glycol, followed by equilibrium zone centrifugation, or from infected fetal pig thyroid cell cultures by differential centrifugation. Most of the particles were spherical with a diameter of 75-120 mμ. Some particles which had been disrupted spontaneously, fixed with formaldehyde or split with ether, revealed an outer membrane and internal beaded filaments. In thin sections of cultured fetal pig thyroid cells infected with the virus, a small number of intracytoplasmic virus particles could be detected 4 hr after infection. The particles increased in number, both intra- and extracellularly, with time, along with an increase in the amount of infective virus in the cultures. The virus particle consisted of a dense nucleoid, 40-60 mμ in diameter, separated by a zone of lesser density from a limiting membrane 56-81 mμ in diameter. Morphological observations indicated that the virus particle matures at the inner surface of the membrane which lines the cisternae of endoplasmic reticulum, perinuclear cisternae, and cytoplasmic vacuoles of unknown origin. Multiplication of TGE virus was not inhibited by 5-iododeoxyuridine, suggesting that its nucleic acid is RNA. The similarity between TGE virus and various myxo- and oncogenic viruses is discussed.

1032 HEMORRHAGE IN THE UPPER DIGESTIVE TRACT. *(Sp.)* Viver Manresa, E. (Soc. Security Hosp., Barcelona, Spain) and J. Curto Cardus. *Cir. Ginec. Urol.* 21(6):543-546, 1967.

Among 128 patients (104 males and 24 females, 10-70 yr old) admitted to the surgical ward with melena and/or hematemesis, 42 had a history of previous hemorrhage and 19 had had prior digestive surgery. The group included 49 with mild bleeding, not requiring transfusions and having hematocrits of 35 or higher, 38 with hematocrits of 20-35, a pulse of more than 90/min and a somewhat decreased blood pressure, requiring 500-1000 ml of blood, and 41 with severe hemorrhage evidence by hematocrits below 20, a weak pulse, tachycardia, and pallor and requiring more than a liter of blood. In the 113 cases in which a diagnosis was possible, bleeding was due to peptic ulcer (74 cases, including 50 duodenal, 4 duodenal and gastric, and 20 gastric ulcers), kissing ulcer (8 cases), oral ulcer (7 cases), gastritis (4 cases), portal hypertension due to cirrhosis (15 cases), cancer (6 cases), and hiatus hernia (2 cases). Twenty emergency operations and 55 other operations were required. The 18 deaths included 9 of 75 treated surgically (2 cancers, 3 ulcers, and 4 with cirrhosis) and 9 of 53 treated conservatively (1 cancer, 3 ulcers, and 5 with cirrhosis). Five of the 20 patients subjected to emergency surgery are included in these mortality data. Bleeding recurred in 8 of the 110 who survived, none of whom had been operated on. Surgery is recommended for: (1) those ulcer patients who are bleeding for the first time, but whose hemorrhage is in the intermediate or severe category; (2) patients with gastric ulcer; (3) ulcer patients with a history of hemorrhage; (4) most patients with severe hemorrhage; (5) patients with portal hypertension who are not helped by conservative measures; and (6) patients with cancer.

1033 RADICAL SURGERY FOR EXTENSIVE MALIGNANT TUMORS OF THE ABDOMINAL CAVITY. *(Ger.)* Rossetti, M. (Surg. Clin., U. Basel, Switzerland). *Chirurg* 39(3):105-109, 1968.

A total of 3,414 abdominal cancer operations were done in the author's clinic from 1952 to 1966. The percentages of cases treated surgically in each type of cancer were: stomach cancer, 70%; cancer of the colon, 82%; rectal cancer, 81%; pancreas cancer, 8%; and esophageal cancer, 20%. Drawing on this experience, the author discusses some of the special problems presented by malignant tumors of the stomach or colon with infiltration of neighboring organs, as well as by tumors of the rectum or duodenopancreas, retroperitoneal tumors (hypernephroma), multiple tumors, and reoperation for either recurrent tumors or tumors which have been evaluated as inoperable. It is emphasized that operability is all too often evaluated on the basis of the patient's prospects for a satisfactory life after a successful operation, instead of purely on the basis of the technical possibilities. In view of the disappointing results of radiation and chemotherapy, surgery remains highly indicated in any case in which there is even a good chance of success. Experience with 1,180 cases of stomach cancer has shown, e.g., that the prognosis is independent of the extent of the primary tumor, being determined almost entirely by the presence or absence of metastasis. This justifies radical gastrectomy, including parts of the spleen, pancreas, transverse colon, liver, diaphragm, and abdominal wall when necessary, but total gastrectomy for admittedly palliative purposes is discouraged. The mortality (12-15%) after radical gastrectomy is no higher than after more conservative procedures, but the antrum should be preserved whenever possible. In cancer of the duodenopancreas, on the other hand, surgery is indicated in only about 10-15% of all those subjected to laparotomy and only 5-8% of all cases treated, and palliative duodenopancreatectomy is definitely not advised. Cancer of the liver is also very difficult to treat surgically, although one case report of successful hepatectomy for cancer in a 65-yr-old woman is presented. Cancer of the colon and rectum, with a 5-yr survival of 40-80%, has a better prognosis than all other cancers of internal organs. Care must be taken, however, to prevent implantation of tumor cells during surgery, and irrigation of the lumen with cytostatic agents may be useful in this connection. In older patients, it is often advisable to decrease the radicality of the operation in order to preserve some intestinal function. Finally, surgery is definitely recommended for cancer of the gastric stump, multiple or sequential tumors, or recurrences in intestinal anastomoses. The "second look" as a routine procedure after cancer surgery has not proved useful, however.

1034 THE STOMACH IN CIRRHOSIS (A RADIOLOGICAL, ANATOMOPATHOLOGICAL AND BIOLOGICAL STUDY OF 250 CASES OF CIRRHOSIS WITH THE AID OF X-RAY RECORDS). *(Fr.)* Fraisse, H., A. Baril, J.-P. Etaix and C. Janisson. *J. Med. Lyon* (1139):445-478, 1968.

Among 250 patients with cirrhosis of the liver, with or without ascites, 129 had a normal gastroduodenal x-ray, while 121 showed various types of pathology; the most common type of abnormality was the so-called antral reaction (79 cases), which is described in an accompanying paper. Ulcers were found in 26, including 12 with a history of ulcer and 14 with associated ulcers (8 gastric and 6 duodenal); in most of these ulcers, however, the symptoms were either atypical or lacking. Gastritis was noted in 11 cases, hiatus hernia in 8, stomach cancer in 2, duodenal diverticula in 2, and gastric filling defects in 3 cases. Esophageal x-ray in the same 250 cases revealed varices in 51 cases, dyskinesia in 4, diverticula in 4, and cancer in one (190 x-rays were normal). A parallel study of histamine-induced gastric secretion in 50 of these patients (34 men and 16 women) revealed a subnormal volume in 61.7-68.7% (hypersecretion in 11.9-12.6%), subnormal acid secretion in 55.5-68.7%, and true achlorhydria in 6-20.5% (8 cases). The incidence of secretion disorders increased with age and with the severity of the cirrhosis. Gastric biopsies were performed in 25 of these patients, only 2 of whom had a normal mucosa; 5 had simple interstitial gastritis, 6 had atrophic interstitial gastritis, and 12 had atrophic and metaplastic gastritis (these 12 included 10 of the 15 cases with hypochlorhydria). There was no correlation between the severity of the lesions and either age or the degree of cirrhosis, but there was a clear parallel between the severity of gastritis and the reduction in gastric secretion. In contrast to the usual rapid manifestation of alcoholic gastritis, most of these cases were essentially asymptomatic.

1035 THE ANTRAL REACTION: A CONTRIBUTION TO THE RADIOLOGICAL STUDY OF THE STOMACH IN CIRRHOSIS (BASED ON 250 CASES). *(Fr.)* Fraisse, H., J. P. Etaix, Gauthier, and C. Janisson. *J. Med. Lyon* (1139):481-488, 1968.

A review of the radiological findings in the stomach and esophagus in 250 cases of cirrhosis revealed morphological abnormalities in the antrum in 79 cases (31.6%). These alterations, referred to simply as the "antral reaction," are thus considerably more common than esophageal varices (20.4%) or varices of the cardia and fundus (1.2%). The most common type of abnormality was the presence of large anarchic rugae (34 cases); in smaller numbers of cases, there were cerebriform or large horizontal rugae (12 and 16 cases, respectively), and in still fewer cases there were spasmodic reactions, pseudoneoplastic reactions with cylindrical stenosis or the appearance of worm-eaten wood, and reactions with transverse rugae. The immediate problem in these cases is usually the differential diagnosis from cancer, since stomach cancer was found in 6 of 780 cases of cirrhosis (2 of 6 antral cancer) and another case had a benign antral tumor; however, cancer accounts for only 2.4% of the antral reactions. The pathogenesis of the antral reaction in general is complex and may involve gastritis as well as varicosity of the submucosal veins.

1036 GASTRODUODENAL ULCER IN PATIENTS WITH CIRRHOSIS (A REPORT OF 40 CASES).

(Fr.) Fraisse, H., J.-P. Etaix and C. Janisson. *J. Med. Lyon* (1139):491-518, 1968.

Among 750 cases of cirrhosis seen during an 11-yr period, 40 (39 cases of alcoholic cirrhosis and 1 of post-hepatitic cirrhosis) had either a history of gastroduodenal ulcer (10 cases) or concomitant ulcers (30 cases). Among the 10 patients (9 men and 1 woman, 38-65 yr old) with a history of ulcer, 7 had a perforation, 2 had hemorrhage, and 3 had suffered from ulcer symptoms for 8-21 yr. One received only medical treatment, suture was performed in 7 cases, and 4 (including 2 initially sutured) received a gastrectomy. Among these 10 patients, 3 died of hepatic coma, and 7 were still alive up to 27 yr later. The 30 patients with concomitant ulcers (22 men and 8 women, 39-73 yr old) included 16 with gastric and 13 with duodenal ulcers, only one of which perforated, and 13 of which produced severe bleeding. The point is made that typical ulcer symptoms are rare in the cirrhotic, there being a high frequency of atypical pain and hemorrhage. The diagnosis is therefore difficult, and differential diagnosis from ulcerative forms of cancer or antral reactions is difficult by means of x-ray alone. Among the 30 cases of associated ulcer and cirrhosis, 17 received medical treatment, 1 was treated by suture, and 9 received a gastrectomy; 9 of the 30 have since died. It is emphasized, however, that among 7 treated medically and followed, 4 experienced severe hemorrhages, while among 9 treated by 67% gastrectomy, only 1 died perioperatively, 1 died 8 yr later, and 6 were alive after periods of 2-4 yr (1 lost to follow-up). Based on data in the literature, it is concluded that the risk of ulcer in patients with cirrhosis is 2-3 times as high as in the general population. Among the various factors which may play a role in the pathogenesis of such ulcers (changes in biliary secretion, trophic disorders of the gastric mucosa, corticosteroids, portal hypertension, and gastric hyperacidity), particular attention is given to cellular anoxia, decreasing the resistance of the gastric mucosa, and secretory stimulants of dietary origin which escape destruction by the liver. Although medical treatment is often effective, hemorrhage may recur in 50% of the cases and may often be fatal. Gastrectomy is therefore recommended for ulcers in cirrhotic patients, particularly if there is a history of hemorrhage or any question about the benign nature of the lesion. In cases of marked portal hypertension, a subsequent portacaval shunt may become necessary.

1037 SERUM MAGNESIUM STUDIES IN GASTROINTESTINAL DISORDERS AND MALNUTRITION.

(E.) Agarwal, V. K. (M.L.N. Med. Coll., Allahabad, India), B. L. Agarwal and V. S. Rajvanshi. *Indian Pediat.* 4(11):407-412, 1967.

Determinations of serum Mg in 25 healthy children and 25 samples of cord blood revealed average values of 2.1 ± 0.22 and 2.5 ± 0.34 mEq/liter, respectively (range 1.7-3.1). Among 24 children with acute gastroenteritis (22 days to 4.5 yr old, but most under 1 yr), 3 (including one of the 8 in whom the nutritional status was good) showed definitely subnormal Mg levels (0.9-1.4 mEq/liter), but only 2 of these were among the 6 children with neurological symptoms (twitching, convulsions, neck rigidity, spasticity, tremors, and choreo-athetoid movements). Two more of these 6 children had low-normal Mg levels (1.7 mEq/liter) and 2 had definitely normal levels; the serum calcium was not determined in these patients. In one of the low-normal cases, symptoms developed only after intravenous fluid therapy and resultant profuse diuresis, after which the serum Mg had fallen to 1.2 mEq/liter. Among 10 children with chronic diarrhea and malnutrition (6 months to 8 yr old, but most under 1.5 yr), complicated by anemia and hypoproteinemia (3.1-4.9 g%), 4 showed definitely subnormal Mg levels, in 3, the Mg was at the lower limit of normal (1.5-1.6 mEq/liter), and in 3, the serum Mg was in the normal range (1.7-1.9 mEq/liter); the serum Ca was below normal in 7 of the 10 cases. The 4 patients in this group with neurological symptoms included 3 with low Mg and Ca levels and 1 with a serum Mg of 1.6 and serum Ca of 9.1 mEq/liter. However, 1 child with a serum Mg of only 1.0 and serum Ca of 9.0 mEq/liter showed no symptoms. Treatment was accompanied by disappearance of the involuntary movements and increases in serum Mg. The difficulty in differentiating between hypomagnesemic and hypocalcemic tetany is pointed out.

1038 COMBINED DUODENAL PANCREATIC TRAUMA: THE ROLE OF END-TO-SIDE GASTROJEJUNOSTOMY.

(E.) Berne, C. J. (Dept. Surg., U. South. California, Los Angeles), A. J. Donovan and W. E. Hagen. *Arch. Surg.* 96(5):712-722, 1968.

Among 16 patients (13 men and 3 women, 16-53 yr old) who were treated by end-to-side gastrojejunostomy for duodenal-pancreatic or severe duodenal injury (blunt trauma in 11 cases and penetrating trauma in 5), 13 recovered after periods of hospitalization of 19-60 days, while 3 died of associated injuries (shock, trauma to liver and kidney, massive hemorrhage from gunshot wounds of the great vessels) within 24 hr postoperatively. The injuries found at surgery included duodenal transection or rupture, avulsion of the choledochus from the duodenum, multiple perforation of the duodenum, avulsion of the duodenum from the pancreas, perforation of the pancreas, and fracture, swelling, or hemorrhage of the pancreatic head. In addition to gastrojejunostomy, various patients received antrectomy (15 cases), debridement and suture of duodenal perforation (14), tube duodenostomy (12), vagotomy (8), biliary tract drainage (7), and a temporary feeding jejunostomy (6 cases). Regional complications following surgery included lateral duodenal fistula in 3 cases (2 of 3 complicated by bleeding, but all 3 closed spontaneously), pancreatitis in 5 cases, and pneumonitis in 3 cases. The incidence of complications and mortality is claimed to be lower than usually reported for this type of injury (mortality rate of 33%). It is pointed out that this operation, in which the duodenum is converted into a decompressed and defunctionalized diverticulum, avoids both the inadequacy of simple closure and the inherent morbidity and high mortality of pancreatoduodenectomy.

1039 **MESENTERY AND BOWEL INJURY FROM AUTOMOTIVE SEAT BELTS.** *(E.)* White, C. L. (City Hosp., St. Louis, Missouri). *Ann. Surg.* 167(4): 486-492, 1968.

Bowel and mesentery perforation and avulsion injuries are described in 6 patients, aged 20-49 yr, following automobile accidents; lap-type seat belts were worn by all. Bowel rupture occurs when intestinal wall tension exceeds its bursting potential, due to rapidly displaced intestinal contents following deceleration. Laceration and disruption of mesenteric connections occur when momentum and kinetic energy rapidly displace the intestine. Deranged bowel propulsion effects suggest modifications in seat belt design.

1040 **A NEW METHOD FOR THE STAGED REPAIR OF LARGE OMPHALOCELES.** *(E.)* Schuster, S. R. (Children's Med. Ctr. and Harvard Med. Sch., Boston, Mass.). *Surg. Gynec. Obstet.* 125(4):837-850, 1967.

Staged surgical procedures for omphalocele reduction are described. Primary repair of large omphaloceles in neonates with either an intact membrane or antenatal or postnatal sac rupture was effective in 9 out of 11 infants. Secondary repair, involving omphalocele reduction and abdominal wall reconstruction after initial skin coverage, was effective in 8 out of 11 children, 4 mo to 8 yr of age. The avoidance of respiratory and vascular complications and the low mortality rate after staged omphalocele repair indicate the effectiveness of this new procedure.

1041 **THE PATHOGENESIS OF PERITONEAL ADHESIONS: AN ULTRASTRUCTURAL STUDY.** *(E.)* Schade, D. S. (Washington U. Sch. Med., St. Louis, Missouri) and J. R. Williamson. *Ann. Surg.* 167(4):500-510, 1968.

Mesothelial cell and serosa alterations were observed by light and electron microscopy in albino rats after intraperitoneal colloidal silica and saline injections (2.5 ml/100 g body weight); peritoneal surfaces and adhesions were examined at postinjection intervals of from 1 min to 6 mo. Numerous silica particles were found adsorbed to the surface and within mesothelial cell microvilli. Fibrous adhesions developed in the following stages: mesothelial cell degeneration and desquamation (0 time-7 hr); basement membrane fibrin decomposition and fibrinous adhesion formation (7 hr-10 days); and transformation of fibrinous to fibrous adhesions (10 days-1 mo). Adhesion formation required mesothelial cell desquamation after silica injection and occurred only when 2 denuded surfaces were in apposition.

1042 **DISEASE OF THE DIGESTIVE SYSTEM: INTESTINAL OBSTRUCTION.** *(E.)* Bevan, P. G. (Dudley Road Hosp., Birmingham, England). *Brit. Med. J.* 1(5593):687-690, 1968.

A description of the mechanism, symptoms, diagnosis, and types of intestinal obstruction is presented. Primary obstruction results from the accumulation of gas and then fluids in the intestinal loop; secondary obstruction is the kinking of the affected loop and relay of the condition to proximal loops. Proximal gastrointestinal secretion and large intestine fluid reabsorption are arrested, leading to severe rapid fluid depletion. The primary symptoms are abdominal pain, vomiting, abdominal distention, and constipation. The types of obstruction are strangulation, closed loop, and functional. The effects of obstruction depend on its gastrointestinal level; small intestine obstruction is the most severe. Lower ileum and colonic obstruction effects develop more slowly. Colonic loop distention may act as an obstructive lesion, leading to complete ileal obstruction with the risk of colonic perforation.

1043 **SOME FACTORS DETERMINING THE DISTRIBUTION OF EXPERIMENTAL HEMORRHAGIC ENTEROPATHY: A SUGGESTED ROLE FOR DIGITALIS IN THE ENTERIC LESION OF CARDIAC FAILURE.** *(E.)* Black-Schaffer, B. (U. Cincinnati Med Ctr., Ohio). *Amer. J. Dig. Dis.* 12(12):1216-1229, 1967.

Twelve female rats (200-250 g), placed on a low residue synthetic diet, were used in an *in vivo* study of hypothermia-induced hemorrhagic enteropathy; jejunocolostomies with intact bypassed ileums were established 3-4 days after diet initiation. The glandular stomach, functional small bowel, and colon were hemorrhagic; the colon and contiguous large bowel were dilated and filled with a watery sludge dumped from the shortened small bowel. The bypassed ileum was pale and contracted about lumen material. The excluded small intestine segments were filled with shrunken shed epithelial cells with pyknotic nuclei. Villous digestion was absent, although the epithelium lining the villi was largely intact. There was no hemorrhage in the excluded ileum segments. Intestinal content determines the degree and localization of hemorrhagic enteropathy. The relatively high incidence of hemorrhagic enteropathy in heart failure may be the result of hypoxia, induced by decreased circulatory gut perfusion, or digitalis-inhibited ATPase; parenteral digitalis administration may minimize or prevent fatal hemorrhagic enteropathy in heart failure.

1044 **GERMFREE SURGICAL RESEARCH: CURRENT STATUS.** *(E.)* Cohn, I. (Louisiana State U. Sch. Med., New Orleans), J. B. Heneghan, F. C. Nance, G. H. Bornside, J. L. Cain, S.-K. Yu and J. A. Labat. *Ann. Surg.* 166(4):518-529, 1967.

Germfree dogs and rats were used to determine the role of bacteria on the fatality of intestinal strangulation obstruction, bile peritonitis, hemorrhagic pancreatitis, and hypovolemic shock; tumor growth, immunosuppression, and organ transplantation were compared in conventional and germfree animals. The importance of bacteria in strangulation obstruction and bile peritonitis fatality was confirmed. Gnotobiotic rats contaminated with *Staphylococcus albus* endured hypovolemic shock better than conventional or germfree rats; this effect is attributed to the animals' superior physiological condition, due to the experimental procedure. Experimental hemorrhagic pancreatitis had the same course in germ free and conventional animals. Immunosuppression studies have advanced since the introduction of gnotobiotic animals; radiation-, neonatal thymectomy-, antilymphocyte serum-, and drug therapy-induced immunosuppression studies are now underway. Organ transplantation and skin-grafting procedures have progressed rapidly with the advent of gnotobiotic experimentation. Clinical applications of germfree technology have been made in patients highly susceptible to bacterial infections.

1045 STUDIES IN INTESTINAL HEALING: III. OBSERVATIONS ON EVERTING INTESTINAL ANASTOMOSES.

(E.) Ravitch, M. M. (Dept. Surg. U. Chicago, Illinois), F. Canalis, A. Weinshelbaum, and J. McCormick. *Ann. Surg.* 166(4):670-680, 1967.

Microscopic and macroscopic examination of dog anastomotic intestinal tissue reveals the superiority of everting over inverting anastomosis. Pervious and impervious foreign material, when wrapped around the anastomotic area, causes suture line disruption. Minimal inflammation, absence of lumen intrusion, quicker vascular anastomosis, greater peritoneal adhesion formation, and closer surface apposition attest to the superiority of everting anastomosis; however, inverting anastomosis heals more rapidly. The problems of mucosal union and external adhesions can be solved with further surgical experimentation employing the technical simplicity and mechanical superiority of everting anastomosis.

1046 DEPRESSION IN MEDICAL INPATIENTS WITH GASTROINTESTINAL DISEASES.

(E.) Schwab, J. J. (Dept. Psychiatry, U. Florida, Gainesville), J. M. Brown and C. E. Holzer. *Amer. J. Gastroent.* 49(2): 146-152, 1968.

Evaluation of 153 inpatients showed that the incidence of depression was higher in gastrointestinal disease patients than in those with other medical problems, except psychiatric illness; 4 measures were used to assess depression. All gastroenterological patients reported a wide variety of symptoms, 5 of which (headache, chest pain, diminution in sexual interest, guilt, and self-hate) distinguish depression. Physicians should be alert to syndromes in which loss of self-esteem and extended somatic symptomology are present, when diagnosing depression in gastroenterological patients.

1047 GASTROCOLECTOMY FOR CANCER: A STUDY OF 41 CASES.

(Fr.) Mouchet, A. (Foch Med.-Surg. Cent., Suresnes, Paris, France), J. Marquand, M. Guivarc'h and S. Delfau. *Ann. Chir.* 22(5/6):329-335, 1968.

The 41 patients (31 of whom were between 50 and 70 yr old) subjected to gastrocolectomy for cancer in the period 1951-67 included 34 with primary tumors of the stomach (32 carcinomas, 1 sarcoma, and 1 lymphosarcoma) and 7 with primary carcinoma of the colon; the duration of symptoms at time of surgery varied from 4-5 weeks to 2 yr (average 7 months), but most showed lymph node involvement. Among the patients with primary stomach cancer, 6 of whom had cancer of the gastric stump (5 of 6 previously operated for benign ulcers), 31 had adhesions between the mesocolon and the tumor, 12 between the transverse colon and the tumor, and 12 between the pancreas and the tumor; among the patients with cancer of the colon, 3 had a cologastric fistula, and 1 had a coloduodenal fistula in addition to gastric involvement. Surgical procedures in the 34 patients with stomach cancer included 19 total gastrectomies (including the 6 with cancer of the gastric stump and 13 others), 16 of which were extended to include the spleen and parts of the pancreas, and 15 subtotal gastrectomies, 2 of which were extended to include the spleen and parts of the pancreas. The choice of total gastrectomy was dictated by necessity and not out of principle. In 27 of these cases, the colectomy was done at the same time as the gastrectomy ("en bloc"), while in 7 it was performed at the end of the operation when the transverse colon was found to be ischemic due to extensive resection of the mesocolon. The 7 patients with primary cancer of the colon were treated by right hemicolectomy plus subtotal gastrectomy (2 cases), transversectomy plus subtotal (3 of 4) or total (1 of 4) gastrectomy (4 cases), and extended excision of the left colon plus cuneiform gastrectomy (1 case). The continuity of the upper digestive tract was reestablished by esophagojejunostomy (18 cases), interposition of an isolated loop of jejunum between the esophagus and duodenum (2 cases), Polya gastrojejunostomy (13 cases), or Péan gastroduodenostomy (7 cases). The continuity of the intestine was reestablished by end-to-end anastomoses in 13 of 34 and 6 of 7 cases, while the other 22 were given colostomies. Attention is called to the fact that fistulas developed in 8 of the 13 cases and none of the 6, and that 4 of the 8 fistulas were fatal; on the other hand, 2 patients died later at closure of their colostomies, so that neither procedure is completely safe. None of the patients with primary cancer of the colon died at surgery, although 3 died later of recurrences, 1 was lost to follow-up, and 3 are living after 6-12 months, 3 yr and 7.5 yr, respectively. Among the 34 patients with stomach cancer, 11 (8 of the 19 subjected to total gastrectomy and 3 of the 15 given subtotal gastrectomy) died at surgery; 5 of these operative deaths were due to fistulas, 2 to hemorrhage, and 1 to intestinal occlusion. Of the 23 survivors, 14 died of recurrent cancer, 2 died at closure of the colostomy, 1 died of unknown causes, and 6 are living after periods of from 6 months to 10 yr. It is emphasized that gastrocolectomy is an operation of last resort but is well justified in case of need.

1048 RADIOLOGICAL CHANGES IN THE SMALL INTESTINES INDUCED BY PROTEIN DEFICIENCY (AN EXPERIMENTAL STUDY ON RHESUS MONKEYS).

(E.) Gadekar, N. G. (All India Inst. Med. Sci., New Delhi) and S. R. Sharma. *Indian J. Radiol.* 21(3):127-131, 1968.

A syndrome resembling kwashiorkor was induced in 16 male rhesus monkeys by feeding a diet deficient in protein but adequate in all other nutrients. There were no significant changes detectable by X-ray after 3 weeks on this diet, although autopsy revealed early atrophy of the gastrointestinal mucosa. After 6 weeks, X-ray studies revealed delayed emptying of the stomach (2.8 hr compared to 1.8 in controls) and dilatation of the small intestine (diameter of 1.6 cm compared to 1.1 cm in controls), but no significant change in transit time to the ileocecal junction. Flocculation of barium in the jejunum was noted in only 2 cases. These changes were correlated with marked atrophy of the gastric and especially the jejunal mucosa, with decreases in the number of mucin-secreting cells and in the absorption of labeled vitamin B_{12}. In 5 animals which were then returned to a complete diet, these changes were found to be reversible, with improvement in 3 of 5 animals after 6 weeks and significant reversal after 9 weeks. It is suggested that protein malnutrition may be responsible for many of the functional, radiological, and structural changes seen in malabsorption.

1049 METABOLIC DERANGEMENTS IN GASTROINTESTINAL SURGERY. *(E.)* Brooke, B. N. and G. Slaney. Springfield, C. C. Thomas, 1967. 169 pp.

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1051 ZOLLINGER-ELLISON SYNDROME IN A PATIENT WITH MULTIPLE CARCINOID-ISLET CELL TUMORS OF THE DUODENUM: EFFECT OF TUMOR EXTRACT ON ISOLATED GASTRIC MUCOSA. *(E.)* Thompson, J. C. (Harbor Gen. Hosp., Torrance, Calif.), F. M. Hirose, C. A. E. Lemmi and W. D. Davidson. *Amer. J. Surg.* 115(2):177-184, 1968.

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1110 STRUCTURE AND ULTRASTRUCTURE OF THE LABIAL SALIVARY GLANDS IN SUBJECTS WITH AND WITHOUT CYSTIC FIBROSIS. [ORAL COMMUNICATION; 8TH ANN. MEETING, SOUTH. SOC. PEDIAT. RES., CHARLOTTESVILLE, VA., NOV. 17-18, 1967.] *(E.)* Harrison, G. M. (Baylor U. Coll. Med., Houston, Texas), B. Bentinck and R. G. Doggett. *Southern Med. J.* 60(12): 1368, 1967.

1111 GASTROINTESTINAL BLEEDING SECONDARY TO PANCREATITIS. [CASE REPORT] *(E.)* Kisken, W. A. (Madison, Wis.). *J.A.M.A.* 202(8):847, 1967.

1112 CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL: CASE 3-1968: RECURRENT VOMITING, DIARRHEA AND MALABSORPTION. *(E.)* Maynard, E. P., III (Massachusetts Gen. Hosp., Boston) and R. B. Cohen. *New Eng. J. Med.* 278(3):155-161, 1968.

1113 GASTROINTESTINAL COMPLICATIONS OF ANTIBIOTIC THERAPY. *(Rev.)(E.)* Fekety, F. R., Jr. (U. Michigan Med. Ctr., Ann Arbor). *J.A.M.A.* 203(3):210-212, 1968.

GENERAL

1114 **PERITONEAL LAVAGE IN PERITONITIS: A PRELIMINARY EVALUATION.** *(E.)* Caridis, D. T. (Dept. Surg., U. Aberdeen, Scotland) and N. A. Matheson. *Brit. Med. J.* 2(5529):219, 1968.

1115 **IMMUNOLOGICAL MECHANISMS AND DIGESTIVE TRACT DISEASES.** *(Fr.)* Leonard, J. P. (Edouard Herriot Hosp., Lyon, France) and R. Lambert. *Presse Med.* 75(50):2545-2550, 1967.

1116 **PARTICIPATION OF PANCREATIC ENZYMES IN DIGESTION IN PATIENTS WITH CHRONIC ENTERITIS (ENTEROCOLITIS).** *(Rus.)* Linevsky, Y. V. (Donetsk). *Vrach. Delo* (3):64-66, 1968.

1117 **SPONTANEOUS SPLENO-RENAL AND GASTRO-RENAL VENOUS ANASTOMOSIS: A STUDY BY OCCLUSIVE CAVAL PHLEBOGRAPHY.** *(Fr.)* Gillot, C. (Paris) A. Castel, P. Waltzing, E. Wanstok and A. Varay. *Arch. Mal. Appar. Dig.* 57(1):39-56, 1968.

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1121 **PERFORATED JEJUNAL ULCER AND THE ZOLLINGER-ELLISON SYNDROME.** *(E.)* Watson, C. G. (West Boxbury, Mass.) R. V. Moseley and H. B. Wheeler. *Arch. Surg.* 96(2):274-276, 1968.

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1126 **STENOSIS OF AN INADVERTENT GASTRO-ILEOSTOMY WITH SEVERE METABOLIC ALKALOSIS.** *(E.)* Thomford, N. R. (Ohio State U. Coll. Med., Columbus), B. L. Bachulis and R. E. Brashear. *Ann. Surg.* 167(4):595-597, 1968.

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1128 **CARCINOMA OF THE BOWEL: RADIATION AND SURGICAL MANAGEMENT AND PREGNANCY.** *(E.)* Barber, H. R. K. (James Ewing Hosp., New York City). *Amer. J. Obstet. Gynec.* 100(7):926-933, 1968.

1129 **THE CONTENT AND COMPOSITION OF FREE AMINO ACIDS IN THE URINE OF PATIENTS WITH GASTRIC CARCINOMA AND DUODENAL ULCER.** *(E.)* Sowinska, B. (Krakow Med. Acad., Poland), B. Adamczyk, J. Kulpa and F. Zontek. *Pol. Med. J.* 6(6):1467-1473, 1968.

1130 **THE IMPORTANCE OF PALPATION: THE EXAMINATION OF THE SALIVARY GLANDS.** *(E.)* Fast, T. B. (Indiana U. Sch. Dentistry, Indianapolis) and D. Forest. *Dental Clin. N. Amer.* March 1968.

1131 **MEASUREMENT OF CENTRAL VENOUS PRESSURE.** *(E.)* Andersen, D. (Bispebjerg Hosp., Copenhagen, Denmark) and J. G. Klebe. *Scand. J. Gastroent.* 3(2):113-122, 1968.

1132 **CARDIAC COMPLICATIONS DUE TO ACUTE GASTROINTESTINAL ESCHEMIA.** *(Fr.)* Dogru, M. (Andara, Turkey) and H. Atasoy. *Bull. Soc. Int. Chir.* 26(6):536-545, 1967.

1133 **DACRON PATCHING AND ITS PLACE IN THE SURGICAL TREATMENT OF HERNIAS LOCA LOCATED IN THE GROIN. CONSIDERATIONS ON 65 PATIENTS BELONGING TO A COMPLETE SERIES OF 274 CASES OPERATED ON FOR HERNIA.** *(Fr.)* Rieves, J., R. Stoppa, L. Fortesa and H. Nicaise. *Ann. Chir.* 22(3-4):159-171, 1968.

1134 **RADICAL PANCREATODUODENECTOMY.** *(E.)* L'Esperance, B. F. (Two Harbors, Minnesota). *Minn. Med.* 50(12):1781-1786, 1967.

See also abstract nos.: 933,1485,1487

ESOPHAGUS

1135 A BALLOON CATHETER FOR THE PREOPERATIVE INSUFFLATION OF ESOPHAGEAL DIVERTICULA. *(Ger.)* Becker, T. (Surg. Clin., Friedrich-Schiller U., Jena, Germany) and B. Schyra. *Zbl. Chir.* 93(2): 74-77, 1968.

A balloon catheter is described by means of which insufflation can be used to reproduce, in the relaxed esophagus, the mechanism which fills the diverticulum during swallowing. The catheter is first introduced into the stomach, after which the lower balloon is inflated and pulled up against the cardia. Two other balloons are then inflated to create a closed segment of esophagus into which air can be pumped, under visual observation during surgery, to inflate the diverticulum before its excision. This technique is particularly suitable for the visualization of either unusually small or unusually large diverticula. The pressures used (5-15 mm Hg, compared to physiological pressures of 10-45 mm Hg at the pharyngoesophageal sphincter) are so low that rupture is impossible. Visualization of the diverticulum shortens the time of surgery and makes possible the preservation of the segmental blood supply to the esophagus.

1136 THE SURGICAL TREATMENT OF UPPER ESOPHAGEAL CARCINOMA BY TOTAL REPLACEMENT OF THE ESOPHAGUS WITH A GASTRIC TUBE. *(Ger.)* Zittel, R. X. (Surg. Clin., U. Freiburg i. Br., Germany). *Chirurg* 39(3):122-124, 1968.

Based on experience with 12 cases (11 men and 1 woman, most over 60 yr old), total replacement of the esophagus by means of a tube formed from the greater curvature of the stomach, with its base at the fundus, is recommended for the treatment of carcinoma of the upper or middle third of the esophagus, as well as for esophageal stenosis. The gastric tube can be raised into position either antesternally or retrosternally (the latter being preferred), after which it is anastomosed to the cervical esophagus. The operation can be either palliative, if the tumor is inoperable, or combined with excision of the cancer; in the latter case, this can be done either as a 1-stage or as a 2-stage procedure (with an interval of 4-6 weeks), and either the excision or the tube construction can be performed first. Feeding by stomach tube is begun 3 days after surgery, and the patient is permitted to swallow food after 9-10 days. Those treated for palliative purposes survive for about one year. Among the 12 personal cases, 7 were inoperable, while 5 were subjected to a 2-stage procedure, the tumor excision being done first in 3 cases. The tube was raised antesternally in 4 cases, retrosternally in 5 cases, and in 3 cases, the gastric tube was constructed with the base in the antrum rather than in the fundus. Nine patients died after periods of 1 week to 2 yr, while 3 are living (one with lymph node metastasis) after 1-4 yr. The procedure is felt to have many advantages over intestinal transplantation.

1137 TRACHEOBRONCHOSCOPY IN 700 PATIENTS WITH CANCER OF THE ESOPHAGUS. *(Fr.)* Chavy, A. (Inst. Gustave Roussy, Villejuif, France), M. Vasselin, J. Fauvet and J. M. Lemoine. *Bronches* 17(5):320-325, 1968.

Over a period of 18 yr, tracheobronchoscopy was carried out immediately after esophageal endoscopy in 700 patients with histologically confirmed cancer of the esophagus. The tracheobronchial tree was normal in 50% of these patients, including 41% of cases with cancer of the upper three-fourths of the esophagus and 90% of those with cancer of the lower esophagus. The remaining 50%, however, showed various degrees of tracheobronchial involvement which was an important factor in determining the correct therapeutic procedure. Although 28% merely showed compression of the trachea or bronchi, with a normal mucosa, 17% (30% of those with cancer of the cervical esophagus) showed infiltrations, and 5% (14% of those with cancer of the cervical esophagus) showed actual growths. It is emphasized that esophageal cancer with involvement of the tracheobronchial tree should never be treated by X-ray, due to the increased danger of perforation. For this reason, tracheobronchoscopy is recommended strongly in all cases of upper esophageal cancer before a decision as to surgical or radiological therapy.

1138 TECHNICAL CHANGES LEADING TO A NEW THEORY TO REPLACE ESOPHAGEAL ACHALASIA. *(E.)* Besançon, F. (Bichat Hosp., Paris, France). *Amer. J. Dig. Dis.* 13(4):361-367, 1968.

In most of 58 patients with idiopathic mega-esophagus, electromanometric studies using filling and emptying as stimuli (instead of the usual dry swallow) revealed mechanical hyperexcitability (rather than failure to relax) in the lower esophageal sphincter and sometimes also in the body of the esophagus. Thus, following the introduction of 6 water-filled and 1 pressure-transducing catheter with the patient lying on the right side, as the body of the esophagus was progressively filled with fluid, the pressure gradually rose in both the body and the sphincter, remaining higher in the sphincter until the two equalized at about 50 cm H_2O. This "reactive spasm," which is the opposite of the usual relaxation seen in response to swallowing, was present in the sphincter in 84% and in the body of the esophagus in 7%. The response is abolished by a successful Heller operation, but is potentiated by small doses of acetyl-β-methylcholine (summation of mechanical and chemical hyperexcitability). It is concluded that a finding of achalasia is an artifact of the recording technique, and is of doubtful significance in the pathogenesis of dysphagia. Retention of the descriptive name mega-esophagus or introduction of the new term plexatrophy are urged to replace the diagnosis of achalasia.

1139 RELATIONSHIP BETWEEN MOTOR CHANGES AND PAIN DURING ESOPHAGEAL ACID PERFUSION. *(E,)* Atkinson, M. (Worcester Royal Infirm., England) and J. R. Bennett. *Amer. J. Dig. Dis.* 13(4):346-350, 1968.

In 40 patients with reflux esophagitis (including 29 with hiatus hernia) and 14 healthy controls, changes in esophageal peristalsis (esophageal intraluminal pressure) showed little correlation with the production of pain during saline and acid perfusion of the esophagus. Infusion of 0.10 N HCl at a rate of 10 ml/min to a point 7-10 cm above the cardia produced pain in 39 of 40 patients and 8 of 14 controls; acid perfusion also produced nonperistaltic contractions in 28 patients and

5 controls, usually intermittent in nature, but only 7 patients showed concurrence between the pain and the esophageal contractions, while in 15 patients, the contractions usually appeared before the pain. Saline infusion, which produced pain in 3 patients, also produced nonperistaltic waves in 10. Infusion of 0.10 N $NaHCO_3$ relieved pain in 20 of 21 patients and all 5 controls, but 8 of the 12 patients studied showed no decrease in the frequency or amplitude of esophageal contractions. Propantheline bromide (30 mg i.v.), on the other hand, inhibited motor activity in 15 of 21 patients, but decreased pain in only 4; pain did not disappear in any case although all muscular activity ceased in many, and in 2 cases, the pain increased after abolition of esophageal motility. There was also no correlation between the severity of the pain and the esophagoscopic findings in 29 patients. It is concluded that pain and increased motility are probably independent effects of acid perfusion.

1140 THE EFFECTS OF EXPERIMENTAL HIATAL HERNIA AND HISTAMINE STIMULATION ON THE INTRINSIC ESOPHAGEAL SPHINCTER. *(E.)* Baue, A. E. (Dept. Surg. Grad. Div., U. Pennsylvania Sch. Med., Philadelphia) and R. E. Hoffer. *Surg. Gynec. Obstet.* 125(4): 791-799, 1967.

Studies are presented on 12 dogs before and after surgical creation of hiatal hernias. The zone of increased pressure or intrinsic sphincter in the lower part of the esophagus of the normal dog was found to have fairly constant characteristics of position, length, and static pressure when studied repeatedly. After creation of a hiatal hernia, the length of the sphincter was significantly decreased, but pressures within the sphincter, although tending to decrease, were not significantly lower. Transient esophagitis developed in many, but persisted in only a few. With histamine stimulation, esophagitis developed in all dogs with hiatal hernias, with severity related to dose. Sphincteric pressures were much lower after 1 month of histamine administration. The decrease in sphincteric pressure was coincident with the progression of esophagitis. In those dogs without hiatal hernias which were receiving histamine, esophagitis did not develop. This study suggests that the extrinsic components of the esophagogastric closing mechanism, particularly the abdominal segment of esophagus and phrenoesophageal membrane, contribute to the effectiveness of the intrinsic sphincter by maintaining an effective length of closure. With a sliding hiatal hernia, the intrinsic sphincter is less effective, but whether or not esophagitis develops may also be determined by the level of gastric acidity.

1141 ESOPHAGEAL PAIN AND MOTILITY. *(E.)* Edwards, D. A. W. (U. Coll. Hosp. Med. Sch., London, England). *Amer. J. Dig. Dis.* 13(4):340-345, 1968.

The possible mechanisms of pain of presumed esophageal origin are discussed on the basis of theoretical considerations and clinical experience with pain in hiatus hernia, esophagitis, esophageal ulcer, bolus obstruction, achalasia, and diffuse spasm. After defining both "pain" and "motility," the author suggests three possible mechanisms for the relations between them: (1) "stretch-pain" receptors in the muscle analogous to those in the wall of the rectum; (2) pain receptors which are stimulated by a metabolite produced as a consequence of prolonged contraction against resistance, analogous to the "P" substance accumulated in ischemic striated muscle; (3) pain receptors in the mucosa, which are stimulated by acid, heat, alcohol, and the passage of solids and may, in turn, produce a local contraction. Specific attention is then turned, however, to the various pain syndromes, and it is pointed out that the cause of pain in each case generally remains unknown. Hiatus hernia *per se,* e.g., apparently does not produce pain, and in esophagitis, it is the acidic nature of the ingested or refluxed material rather than the volume or pressure or the accompanying movement that is responsible for pain. Esophageal spasm is also not generally painful, and in most cases "spasm" is a radiologic or endoscopic misdiagnosis for achalasia or stricture. Bolus obstruction is nearly always painful, but the pain is related to the impaction of food on the sensitive mucosa rather than to pressure changes. Based on the questioning and examination of more than 150 patients with achalasia, four patterns of pain have been distinguished, none of which are necessarily related to motility: (1) a severe spontaneous pain of widespread distribution which lasts from a few minutes to several hours and is usually alleviated by drinking cold water, but not by octyl nitrite (reported by 111 out of 159 patients); (2) a sense of bursting pain after rapid drinking or eating, which is relieved by regurgitation (reported by 67 patients); (3) pain due to impaction of food at the cardiac sphincter (reported by 108 patients); (4) "heartburn" (reported by 24 patients). Finally, mention is made of the severe retrosternal and high epigastric pain which usually goes through to the back, occurs at night with a dramatic onset, and is accompanied by vomiting, but not by abnormal laboratory findings; the only possible cause detected so far for this type of pain is a small hiatus hernia with a tight hiatus.

1142 ESOPHAGOMYOTOMY FOR ESOPHAGEAL ACHALASIA: EXPERIMENTAL, CLINICAL, AND MANOMETRIC ASPECTS. *(E.)* Ellis, F. H., Jr. (Mayo Clinic, Rochester, Minn.), J. C. Kiser, J. F. Schlegel, R. J. Earlam, J. L. McVey and A. M. Olsen. *Ann. Surg.* 166(4): 640-656, 1967.

Three types of myotomy were performed on the esophagogastric junctional area of dogs: a "classic" Heller double myotomy, a "long" Heller myotomy, and a "short" Heller myotomy. There was roentgenoscopic evidence of gastroesophageal reflux after the classic and long Heller but not after the short Heller procedure. Spontaneous esophagitis occurred only after the classic Heller procedure. The technical details of esophagomyotomy (modified Heller procedure) are described and its use in 269 patients is analyzed. During a follow-up period averaging 6 years, symptoms were alleviated in 93% of patients observed postoperatively for a year or more. Poor results were related either to gastroesophageal reflux (10 patients) or to persistent or recurrent symptoms of esophageal obstruction (six patients) due either to an incomplete operation or to reapproximation of the incised muscle edges by scar formation. Late postoperative manometric studies of esophageal motility demonstrated a decrease of sphincteric pressure and a shortening of the increased pressure zone between the stomach and esophagus at the expense of its suprahiatal portion. These changes persisted as long as 93 months postoperatively. Esophagomyotomy by the techniques described is the primary treatment of choice for symptomatic patients with esophageal achalasia and should be done early in the course of the disease.

ESOPHAGUS

1143 THE ANATOMY OF THE ESOPHAGEAL HIATUS. *(E.)* Bowden, R. E. M. (Royal Free Hosp. Sch. Med., London, England) and H. A. El-Ramli. *Brit. J. Surg.* 54(12):983-989, 1967.

1144 MALIGNANT VILLOUS TUMOR IN A COLON BYPASS. [CASE REPORT] *(E.)* Goldsmith, H. S. (Mem. Sloan-Kettering Cancer Ctr., New York City) and E. J. Beattie, Jr. *Ann. Surg.* 167(1):98-100, 1968.

1145 INDIRECT METHOD OF EXTRACTION OF FOREIGN BODY FROM THE ESOPHAGUS. *(E.)* Symbas, P. N. (Dept. Surg., Emory U., Atlanta, Ga.). *Ann. Surg.* 167(1):78-80, 1968.

1146 VERATZUNGEN DER SPEISEROHRE BEI KINDERN (CHEMICAL BURNS OF THE ESOPHAGUS IN CHILDREN). *(Ger.)* Biezins, A. P. Berlin, VEB Verlag Volk und Gesundheit, 1967. 210 pp.

1147 PRIMARY AMYLOID TUMOUR OF THE OESOPHAGUS TREATED BY COLON TRANSPLANT. [CASE REPORT] *(E.)* Solanke, T. F. (U. Coll. Hosp., Ibadan, Nigeria), E. O. Olurin, F. Nwakonobi and I. O. K. Udeozo. *Brit. J. Surg.* 54(11):943-946, 1967.

1148 SOME CLINICAL ASPECTS OF DISORDERS OF THE LOWER ESOPHAGUS. *(Sp.)* Castex, M. R. *Rev. Asoc. Med. Argent.* 82(1/2):1-19, 1968.

1149 UNILATERAL LESION OF THE VAGOSPINAL NERVE WITH ESOPHAGASTRIC PARALYSIS. *(Fr.)* Mounier-Kuhn, P. (Lyon), G. Allegre, R. Charachon and A. Faivre. *Ann. Otolaryng. (Paris)* 85(2):131-138, 1968.

1150 A SIMPLE METHOD FOR CYTOLOGICAL DIAGNOSIS OF ESOPHAGEAL CANCER. *(Sp.)* Poleo, J. R. (Vargas Hosp., Caracas, Venezuela), H. Vegas and F. A. Gallegos. *G.E.N.* 22(2):111-116, 1967.

1151 THE SURGICAL TREATMENT OF INFLAMMATORY ESOPHAGEAL STENOSIS. *(Rev.) (Ger.)* Amgwerd, R. (Canton Hosp., St. Gallen, Switzerland). *Helv. Chir. Acta* 35(1/2):5-10, 1968.

1152 SURGERY OF THE ESOPHAGUS (CONCLUDED). *(E.)* Wilkins, E. W., Jr. (Massachusetts Gen. Hosp., Boston) and D. B. Skinner. *New Eng. J. Med.* 278(16):887-891, 1968.

1153 BENIGN TUMORS OF THE ESOPHAGUS AND HIATUS HERNIAS. *(Rus.)* Gukasyan, A. A. (1st I. M. Sechenov Moscow Med. Inst., USSR), N. N. Kanshin, A. F. Chernousov and V. M. Arablinskii. *Khirurgiia (Moskva)* 44(1):20-24, 1968.

1154 ROENTGENOGRAPHIC DOCUMENTATION OF THE MALLORY-WEISS SYNDROME. [TWO CASES] *(E.)* Sparberg, M. (Northwest. U. Sch. Med., Chicago, Ill.). *J.A.M.A.* 203(2):151-152, 1968.

1155 FAMILIAL DYSAUTONOMIA: A CINERADIOGRAPHIC STUDY OF THE SWALLOWING MECHANISM. *(E.)* Margulies, S. I. (Johns Hopkins Hosp., Baltimore, Md.), P. W. Brunt, M. W. Donner and M. L. Silbiger. *Radiology* 90(1):107-112, 1968.

1156 PROBLEMS ENCOUNTERED IN THE MANAGEMENT OF CONGENITAL ESOPHAGEAL ANOMALIES. [FOUR CASES] *(E.)* Blank, R. H. (Tampa Gen. Hosp., Fla.), R. G. Connar and L. M. Carlton, Jr. *Southern Med. J.* 60(11):1180-1183, 1967.

1157 ACHALASIA OF THE ESOPHAGUS: DIAGNOSIS AND TREATMENT. *(Rev.)(E.)* Schroder, J. S. (Emory U. Sch. Med., Atlanta, Ga.) and C. R. Hatcher, Jr. *J.A.M.A.* 202(7):620-623, 1967.

1158 THE EFFECT OF ACID UPON THE ACTIVITY OF THE LOWER OESOPHAGEAL SPHINCTER. [ORAL COMMUNICATION; SURG. RES. SOC., ABERDEEN, JULY 14-15, 1967.] *(E.)* Giles, G. R. (U. Dept. Surg., Leeds Gen. Infirm., England), G. C. Clark and M. C. Mason. *Brit. J. Surg.* 55(1):71, 1968.

1159 TREATMENT OF REFLUX BY THE SO-CALLED MODIFIED HELLER-NISSEN TECHNIQUE. *(Fr.)* Dor, J., P. Humbert, J. M. Paoli, M. Noirclerc and J. Aubert. *Presse Med.* 75(50):2563-2565, 1967.

1160 DIAGNOSIS AND TREATMENT OF CANCER OF THE ESOPHAGUS. *(Fr.)* Robert, J., L. Adenis, R. Delacroix and A. Lequint. *Clinique* 63(640):137-143, 1968.

1161 THE ROLE OF ESOPHAGEAL DYSFUNCTION IN THE PULMONARY EFFECTS OF EXPERIMENTAL VAGOTOMY. *(E.)* Milley, P. S. (Health Sci. Ctr., New York State U., Buffalo). *Amer. J. Path.* 52(4):917-933, 1968.

1162 A PEDICLED TUMOUR OF THE OESOPHAGUS. *(E.)* Van Elk, P. J. *Arch. Chir. Neerl.* 19(4):313-318, 1967.

1163 LATE RESULTS OF ESOPHAGECTOMY. *(E.)* Gilat, T. *Harefuah* 73(10):52-53, 1967.

1164 AN EFFECTIVE OPERATION FOR HIATAL HERNIA: AN EIGHT YEAR APPRAISAL. *(E.)* Hill, L. D. (Mason Clin., Seattle, Wash.). *Ann. Surg.* 166(4):681-692, 1967.

1165 CANCERS DEVELOPING ON AN IDIOPATHIC MEGA-OESOPHAGUS. *(Fr.)* Debray, Ch. (Paris), J. Leymorios, J.-P. Etienne and J.P. Cuq. *Arch. Franc. Maladies d l'Appareil Digestif 57(1):5-24, 1968.*

See also abstract nos.: 884,940,942

STOMACH
(Gastric ulcer is placed with peptic ulcer)

1166 FUNCTIONAL AND MORPHOLOGICAL STATE OF THE GASTRIC STUMP MUCOSA IN POSTRESECTION SYNDROMES. *(Rus.)* Gukasyan, A. G. (I. M. Sechenov 1st Moscow Med. Inst., USSR) and A. G. Semichastnova. *Ter. Arkh.* 40(2):19-24, 1968.

Among 47 patients (40 men and 7 women) subjected to surgery (Billroth I in 3 cases, Billroth II in 44) for peptic ulcer (gastric in 19, duodenal in 28) from less than 1 yr (5 of 47) to more than 11 yr (4 of 47) before (2-5 yr in 29 of 47 and 6-10 yr in 9 of 47), only 12 (all operated on more than 5 yr before) reported subjective gastric symptoms (postprandial epigastric pain, abdominal fullness, loss of appetite, diarrhea, nausea and/or vomiting). In the other 35 patients who felt well, however, a detailed study of gastric morphology and function revealed many significant abnormalities. Thus, the volume of the gastric juice was decreased to 10 ml in all except the 5 cases with the shortest post-operative follow-up, in whom it was 20-30 ml; free HCl was absent (histamine-refractory achylia) from most samples, depending on the extent of resection and the time since operation. The pepsinogen content of the gastric juice was 0.25-0.4 g%, paralleling the reduction in acid production and the change in the relative amounts of gastric proteins (increased amounts of insoluble mucin and mucoprotease, and decreased amounts of mucoprotein and pepsin). Gastric biopsy specimens were histologically normal in only 4 of 47, the other 43 showing varying degrees of gastritis, from superficial (9 cases) to atrophic (14 cases), and accompanied in 20 cases by reconstruction to a pyloric or intestinal type of mucosa.

1167 PROBLEMS OF RECOGNIZING CANCER OF THE STOMACH BY GASTROSCOPIC TECHNIQUES. *(Rus.)* Sokolov, L. K. (Acad. Med. Sci., USSR, Moscow). *Sovet. Med.* (2):10-15, 1968.

Among 98 patients (27-71 yr old) examined endoscopically over a 4-yr period because of doubtful clinical or radiological findings suggestive of cancer, 20 were examined with a flexible gastroscope of Russian make, 34 with the Hirschowitz fiberscope, and 44 with a flexible photogastroscope (Gastroflex); in 20 of these 44, biopsies were taken under visual control by means of the Levallois gastroscope. Some of the patients were studied repeatedly in order to evaluate the changes in the initial lesions. Analysis of the results showed that a correct diagnosis was eventually achieved in 92 of the 98 cases; a correct diagnosis was indicated by X-ray in 77 cases and by gastroscopy in 85, while in 72 of the 92 cases the two methods were in agreement. The advantages and deficiencies of the Levallois gastroscope for gastric biopsy are discussed in detail, and some of the factors which affect the success of gastroscopic examination are outlined; these include, particularly, the type of tumor, its size and position, and the extent of infiltration, all of which may affect not only its visibility but also the ease with which the instruments can be introduced into the stomach. It is emphasized that visually-controlled biopsy is incomparably more useful than blind aspiration biopsy in the diagnosis of gastric malignancies. The use of the newer endoscopic techniques, supplemented by serial studies and by biopsy in doubtful cases, has greatly increased the possibility of differential diagnosis between benign and malignant gastric ulcers, gastric polyps, gastritis, and incipient gastric cancer.

1168 VOLUMINOUS PHYTOBEZOAR WITH MULTIPLE GASTRIC ULCERS. *(Fr.)* Chassagnon, C. (Jules-Courmont Hosp., Lyon, France), G. Braillon and M. Amiel. *J. Med. Lyon* (1137):289-294, 1968.

In a 53-yr-old man presenting with epigastric pain and a large filling defect giving the radiological appearance of a probably benign gastric tumor, surgery revealed a phytobezoar 5 x 15 cm in size, plus three ulcers, one of which had perforated into the liver. Recovery after gastrectomy and gastroduodenostomy was uneventful. It is suggested that the association between phytobezoar and ulcers, found in about 10% of the cases, may be due either to chronic erosion of the gastric mucosa by the foreign body, or to the promoting effect of a preexisting ulcer on phytobezoar formation; the mechanism of the latter remains unclear.

1169 LEIOMYOSARCOMA OF THE STOMACH. *(Sp.)* Merino Peinado, A. (Milit. Hosp., Logroño, Spain). *Med. Cir. Guerra* 30(1):11-18, 1968.

The incidence, classification, biochemistry, anatomy, physiology, etiology, symptomatology, diagnosis, prognosis and treatment of gastric leiomyosarcoma are discussed on the basis of one personal case (55-yr-old woman, the first in Spain) and a review of the literature. The point is made that leiomyosarcoma represents about 20% of all gastric sarcomas, or therefore about 1% of all gastric malignancies. Both extrinsic and intrinsic (hereditary) factors may play a role in its pathogenesis, and attention is called to the possible mutagenic action of the enteric viruses which are said to be responsible for ulcerative colitis. The diagnosis, indicated by radiology and gastroscopy, can only be confirmed by biopsy. Following successful surgery, the prognosis is significantly more favorable than for carcinoma (5-yr survival of more than 50%). 18 refs.

1170 INDICATIONS, TECHNIQUE AND RESULTS OF TOTAL GASTRECTOMY IN THE TREATMENT OF GASTRIC CARCINOMA. *(Ger.)* Hegemann, G. (Surg. Clin., U. Erlangen-Nuremberg, Germany) and F. Gall. *Deutsch. Med. Wschr.* 93(8):329-335, 1968.

Data in the literature indicate that the 5-yr survival rate is only 10.5% for all patients with gastric carcinoma and 24% for resected patients, and that 72% of the deaths in the latter group are due to carcinoma of the gastric stump or perigastric lymph nodes. More extensive surgery would therefore seem indicated, but this is also accompanied by higher operative mortality, especially in older or severely cachectic patients, so that the indications for "total" gastrectomy (gastrectomy plus excision of the tail of the pancreas, the spleen, the pancreaticolienal lymph nodes and the lymph nodes along the left gastric artery near the cardia) must be carefully drawn. Among 1085 patients admitted for stomach cancer in recent yr, 139 were immediately recognized to be inoperable, 461 were discharged as incurable after laparotomy (157 of these had palliative surgery), 297 had a partial distal resection (Billroth I or II), 75 had a fundectomy (a procedure which is no longer recommended), and 113 had "total" gastrectomy; in 64 of these 113, one or more adjacent organs were also removed (pancreas in 28, spleen in 60, colon in 5 and a lobe of the liver in 6). The surgery was completed by an end-to-side esophagojejunostomy with either a Braun anastomosis or a β-anastomosis of Nakayama, by a Roux-en-Y esophagojejunostomy, or by interposition of a small intestinal segment (technique of Longmire-Henley-Sacharow). The Jezioro procedure is recommended for improving the blood supply in the anastomosis. The operative mortality (34 of 113) included 21 of the 64 cases subjected to the most extensive surgery, and was considerably higher (62.1%) in those over 65 yr of age than in those who were below 50 (17.4%). In the 34 who died, the average age was 63.5 yr and the weight loss before operation averaged 9.9 kg, compared to 56.5 yr and 6.7 kg among those who survived the operation. Of the 34 deaths, 22 were due to local complications, including 12 cases of suture insufficiency. Among the 77 who were discharged postoperatively, 31 died in an average of 13 months, 11 lived for 5 yr or more, and 35 others were living at time of publication, 2-5 yr after surgery. Among 22 survivors studied in detail, 5 ate a normal diet without limitation, although all ate more frequently than usual (up to 5-10 times a day); 12 of the 22 took enzyme supplements regularly and 10 did not, but 50% of each group showed generally satisfactory nutrition. Reflux esophagitis was reported by 17 of the 22, and could not be prevented by any of the techniques for anastomosis. Consistent weight gain following discharge seems to be the best index of satisfactory progress, and persistent weight loss can be equated with a recurrence. Vitamin B_{12} was found to be necessary for the prevention of macrocytic anemia. Given proper postoperative care, most of the survivors are able to return to work. In view of these results, "total" gastrectomy is felt to be indicated in all diffuse infiltrating tumors, tumors of the fundus and cardia, and corpus tumors with involvement of the pancreas, spleen or perigastric lymph nodes. It is not indicated in carcinoma of the antrum, and is contraindicated in cases with extensive lymph node or distant metastases in which it could only have a palliative effect.

1171 GASTRIC BEZOAR. *(It.)* Ferraris, P. (S. Anna Hosp., Como, Italy). *Chir. Gastroent.* 2(1):6-21, 1968.

Among 5000 patients subjected to gastric surgery in a 30-yr period, 12 (8 men and 4 women, 31-79 yr old) were found to have phytobezoars; these conglomerations ranged in weight from 20 to 400 g and were accompanied by ulcers in 4 cases (3 gastric and 1 duodenal). The 12 patients included 5 in which a phytobezoar was found obstructing the ileum after prior gastric surgery. Based on a review of the literature on the composition and structure, symptoms, complications, diagnosis, prognosis, etiology and treatment of gastric bezoars, it is pointed out that about 55% of the cases are actually trichobezoars, caused by the habitual ingestion of hair (mostly in young women). Phytobezoars, on the other hand, are found mostly in males between the ages of 30 and 50, and have a complex etiology. Their diagnosis is usually accomplished radiologically, and the only dependable treatment is surgery. Complications can include gastritis, gastrointestinal atonia, and ulcers, which do not seem to be ascribable simply to the erosive effect of the foreign body. Factors which play a role in the development of phytobezoars include the ingestion of large amounts of foods with a high fiber and cellulose content, the filtering effect of masses of matted fibers, and decreases in peristaltic activity, particularly in the function of the fundus. Such decreases in peristalsis can be caused by intestinal distension, previous gastric resection or vagotomy, concurrent ulcers, or a variety of chemical effects, including inability of the gastric juice, especially if dilute, to attack cellulose or compact masses of indigestible materials, the presence of pectins and mucins which tend to coagulate in an acid environment, and the presence of astringent substances such as tannic or citric acid which can precipitate in acid solution and can affect the superficial circulation and motility of the gastric mucosa. 36 refs.

1172 ATROPINE AND MORPHINE EFFECT UPON EVACUATION OF THE GASTRIC CONTENTS IN PATIENTS WITH DUODENAL ULCER. *(Rus.)* Belousov, A. S. (Cent. Inst. Postgrad. Med., Moscow, USSR), G. L. Levin and V. G. Abramova. *Sovet. Med.* (2):67-71, 1968.

In 42 patients (30 men and 12 women, mostly below 30 yr of age) with duodenal ulcers of from less than 1 yr (17 cases) to more than 5 yr (7 cases) duration, experiments carried out by means of a "pH" radiocapsule attached to the end of a duodenal catheter showed that the i.v. injection of either atropine (1 ml 0.1% solution) or morphine (1 ml 1% solution) delays the evacuation of a bread meal from the stomach. In 30 patients given atropine, gastric emptying was delayed for 30-90 min while the intragastric pressure either remained unchanged or tended to fall; there was no change in gastric pH, but a marked drop in the rate of gastric secretion. In 12 patients given morphine, gastric emptying was delayed for 20-45 min and the intragastric pressure rose by 20-30 cm H_2O. These results indicate that the effect of atropine is due to inhibition of gastric peristalsis, while that of morphine is due to a protracted spasm of the pylorus.

1173 SOME CONSIDERATIONS ON CANCER OF THE GASTRIC STUMP FOLLOWING GASTRIC RESECTION FOR BENIGN ULCER. *(It.)* Cincioni, A. (S. Verdiana Hosp., Florence, Italy), A. Pesci and M. Lensi. *Chir. Gastroent.* 2(1):92-102, 1968.

Four cases are reported (males, 46-66 yr old) in which inoperable carcinoma of the gastric stump was discovered 7-29 yr (average 20 yr) after partial gastrectomy for duodenal ulcer. This represents an incidence of 0.5%, given the criteria that at least two-thirds of the stomach had to have been resected and at least 5 yr must have elapsed between the ulcer surgery and the cancer. The rapid spread to other organs in such cases is ascribed to the anatomy of the gastric stump. While acknowledging that cancer of the gastric stump could be a coincidental development, it seems likely that the achlorhydria, gastric alkalinity, chronic inflammation and intestinal metaplasia of the gastric mucosa which follow gastrectomy play a role in its pathogenesis. It is also noted that one of the four cases had a family history of gastric cancer, ulcers and gastritis.

1174 BENIGN TUMORS OF THE STOMACH. *(Ser.)* Ivanišević, B. (Med. Fac., U. Zagreb, Yugoslavia), S. Čičin-Šain and I. Prpić. *Lijecn. Vjesn.* 89(11):825-834, 1967.

The symptoms, diagnosis, and treatment of benign gastric tumors are discussed on the basis of 21 cases (13 males and 8 females, 21-73 yr old) of benign tumors found among the 339 gastric tumors treated in the period 1955-65. The most common symptoms were epigastric pain, vomiting, and abdominal swelling, usually over a period of 1-5 yr. The gastric acidity was below normal in 16 of the 21 cases (including 9 who were anacid), normal in 1 and above normal in 4. Bleeding was noted in 11 cases (7 acute and 4 occult). Radiologically, the tumors were revealed by solitary or multiple filling defects. Histological examination of the excised tumors revealed 13 cases of polyposis (11 of which had been diagnosed radiologically and 1 of which showed malignant degeneration), including 9 adenomatous polyps, as well as 4 neurinomas, 1 fibroma, 1 leimyoma, 1 adenoma, and 1 granuloma. Epithelial tumors were thus more frequent than those of mesenchymal origin. The only effective treatment for benign gastric tumors is gastric resection.

1175 ALTERATIONS IN ARTERIAL NERVES IN CANCER, ULCER AND POLYPOSIS OF THE STOMACH. *(Rus.)* Urbonas, A. P. (Med. Inst., Kaunas, USSR) and S. I. Zhvirdauskas. *Vop. Onkol.* 14(2): 23-28, 1968.

The nerve fibers and nerve endings in the walls of the aorta and of gastric, common carotid, subclavian, femoral, and other arteries were studied microscopically in a total of 97 cases, including 30 patients who died of gastric cancer, 15 who died of cancer of the lungs or uterine cervix, 20 patients who were operated on for stage-2 gastric cancer, 20 patients with peptic ulcer disease, 10 with gastric polyposis, and 2 who were found on autopsy to have stage-2 gastric cancer after dying of other causes. Edema, swelling, and focal leukocytic infiltration of the connective tissue, as well as fragmentation of the elastic fibers and increased metachromasia, were observed in the membranes of the arterial walls of all the patients who died of cancer, regardless of the site. The nerve plexi in these arteries also showed marked dystrophic-destructive changes, with fragmentation and often fine-granular degeneration of the axial cylinders, together with varicose swelling and vacuolization of both the neurons and the nerve endings. All of these changes were more marked in the larger arteries. Similar changes were observed in the arteries from patients with stage-II gastric cancer, but the alterations were less pronounced. In patients with peptic ulcer disease the dystrophic changes in the arterial walls were insignificant, although suggestive, and in patients with gastric polyposis the nerves of the arterial walls were normal.

1176 ANALYSIS OF THE RADIOLOGICAL FINDINGS IN LYMPHORETICULAR TUMORS OF THE STOMACH: A STUDY OF 34 CASES. *(It.)* Severini, A. (Inst. Radiol., U. Milan, Italy). *Ann. Radiol. Diagn.* 41(2): 101-120, 1968.

The clinical and radiological findings in lymphoreticular sarcoma of the stomach are discussed on the basis of 34 cases (8 lymphosarcomas, 22 reticulosarcomas, 2 lymphoreticulosarcomas, and 2 malignant lymphogranulomas) seen during the period 1936-65. Of the 34 gastric tumors, 24 were primary, with or without lymph node involvement, and 10 were secondary or doubtful (4 secondary to pharyngeal tumors and 3 in patients with systemic sarcomatosis). A palpable abdominal mass was reported in 10 cases, epigastric pain in 22, weight loss in 17, vomiting in 12, and anorexia in 7. In 14 cases, the correct diagnosis was reached by radiology, while in 16 others, the initial diagnosis was gastric carcinoma. Radiological findings included filling defects in 28 cases, mucosal hyperplasia in 20, ulceration in 19, superficial peristalsis in 19, and the absence of peristalsis in 13 (including 74.5% of those with a duration of symptoms of more than 2 yr). It is concluded that there is no pathognomonic radiological picture for lymphoreticular sarcomas of the stomach, and that the differential diagnosis from mucosal hypertrophy, peptic ulcer, and especially gastric carcinoma is very difficult in the case of primary tumors. Neither are there any particular radiological findings associated with the different histological types, although, in general, at least in the author's personal experience, the undifferentiated reticulosarcomas, which develop more rapidly, are characterized by an earlier appearance of radiological involvement of the mucosa (especially ulceration), while radiological signs of submucosal infiltration (mucosal hypertrophy) predominate in the slower-growing lymphosarcomas and differentiated reticulosarcomas. The lymphoreticular sarcomas in general usually involve the lower half of the stomach, particularly near the antrum, but with equal involvement of the lesser and greater curvature; the neoplastic foci can be pluricentric and are manifested by regular or irregular filling defects, typically with distinct contours and, often, band-like or areolar, plus benign or malignant ulceration. Peristalsis is commonly preserved, although superficial, and gastric emptying is usually normal, but may be delayed.

1177 HISTOLOGICAL AND FUNCTIONAL STUDY OF GASTRIC MUCOSA IN TROPICAL SPRUE. *(E.)* Desai, H. G. (Tata Mem. Hosp., Bombay, India), A. V. Borkar and K. N. Jeejeebhoy. *Gut* 9(1):34-37, 1968.

The histology and secretory function of the gastric mucosa were compared by means of gastric biopsy and/or the augmented histamine test in 36 healthy controls (30 men and 6 women, mean age 35 yr) without gastrointestinal symptoms, 22 patients (17 men and 5 women, mean age 36.3 yr) with vague gastrointestinal symptoms (postpradial abdominal distension or heaviness, chronic, dull abdominal pain, vomiting, anorexia or flatulence) but no apparent organic cause (normal jejunal mucosa and absorption tests), and 34 patients (26 men and 8 women, mean age 36 yr) with confirmed tropical sprue. Gastric biopsy findings were normal in 18 of 24 controls, 9 of 22 patients with vague gastrointestinal symptoms and 15 of 30 patients with sprue, the others showing evidence of superficial (11 cases) or atrophic (2 of 24, 10 of 22, and 11 of 30) gastritis. The maximal acid output after 0.04 mg/kg of histamine was 15.62 ± 6.72 mEq/hr in controls, 9.82 ± 4.93 mEq/hr in patients with vague gastrointestinal symptoms, and 7.32 ± 6.47 mEq/hr in patients with sprue. These findings correlated well with the gastric biopsy findings. There was no correlation, however, between the histology of the gastric mucosa and that of the jejunal mucosa or other laboratory findings in patients with sprue. It is concluded that chronic gastritis and tropical sprue are probably two unrelated conditions coexisting in the same population.

1178 GASTRIC CANCER ASSOCIATED WITH GASTROENTEROSTOMY AND PARTIAL GASTRECTOMY. *(E.)* Pygott, F. (Cent. Middlesex Hosp., London, England) and V. L. Shah. *Gut* 9(1):117-124, 1968.

The radiological diagnosis of gastric stump carcinoma is discussed on the basis of 13 patients (11 men and 2 women, 48-81 yr old) who developed gastric cancer 8-50 yr (average 26 yr) after surgery (gastroenterostomy in 8 cases, Polya gastrectomy in 5 cases) for peptic ulcer. At the time of the original operation, the patients were 22-64 yr old; at the time of diagnosis of cancer, they had had symptoms for periods of a few weeks to 2 yr (average 6 months). Only 4 could still be treated surgically (Polya gastrectomy), and 3 of these died within 18 months; one patient was alive one year postoperatively. Abdominal x-ray after a barium meal yielded a correct diagnosis immediately in 6 of the 13 cases, while in the others additional studies or exploratory laparotomy were required. It is pointed out that a malignant lesion is much more likely than a simple stomal ulcer if the original operation was more than 10 yr ago and especially if it was for gastric ulcer.

1179 A CYTOCHEMICAL STUDY ON NUCLEI ISOLATED FROM HUMAN GASTRIC CANCER.

(Jap.) Mizogami, K. (Nara Med. U., Japan). *Nara Med. J.* 19(1):113-126, 1968.

The protein and DNA content of nuclei isolated from cancerous and noncancerous stomach tissue was compared in 26 patients (18 men and 8 women, 26-67 yr old) with peptic ulcer (8 cases), gastric polyps (1 case), gastritis (4 cases), and stomach cancer (13 cases). Although the ratio of protein to DNA was slightly lower in cancer tissue (4.5 compared to 4.9), the amounts of both protein and DNA per nucleus were markedly increased in cancer tissue (33% for protein and 50% for DNA). The increase in protein in cancer tissue was found to be due entirely to an increase in basic proteins (histones), which increased by about 200%, resulting in a doubling of the ratio between basic protein and DNA (from 0.9 in noncancerous tissue to 2.0 in cancer tissue). For purposes of comparison, the giant nuclei isolated from the livers of Wistar rats pretreated with thioacetamide (0.4 mg/g diet for 6 days) were analyzed in the same way. In this case, while there was little change in the content of basic protein or DNA (ratio of about 1.0 in both normal and thioacetamide-treated animals), the content of residual protein in the nuclei increased by about 20%, and the ratio between residual protein and DNA increased from 1.69 to 2.02.

1180 IMMUNOGLOBULINS IgA AND IgG IN GASTRIC MUCOSA OF PATIENTS WITH ATROPHIC GASTRITIS AND PERNICIOUS ANEMIA.

(E.) Brus, I. (New York Med. Coll., New York City), H. Siegel, N. Yamaguchi and G. B. Jerzy Glass. *Scand. J. Gastroent.* 3(1):43-57, 1968.

Immunoglobulin content and distribution in gastric mucosa, the presence or absence of circulating serum parietal cell and intrinsic factor antibodies, and gastric intrinsic factor output were studied using gastric biopsy specimens from 13 normal subjects, 6 superficial gastritis patients, 18 atrophic gastritis patients with intestinal metaplasia, and 18 atrophic gastritis patients without intestinal metaplasia; 6 atrophic gastritis with intestinal metaplasia patients had pernicious anemia. Small amounts of immunoglobulins (IgA and IgG) are found in normal individuals; the amount increases with gastritis, especially atrophic gastritis without metaplasia. Immunoglobulins, mostly IgA, are found in round cell infiltrates, and correlation exists between round cells infiltrating gastric mucosa and the immunoglobulin content. No correlation between the presence or absence of circulating parietal cell and intrinsic factor antibodies and immunoglobulin content is found, or between intrinsic factor output and immunoglobulin content. Parietal cell antibody was undetectable in gastric mucosa in atrophic gastritis. Intrinsic factor output was impaired in atrophic gastritis with intestinal metaplasia; immunoglobulin content was lower than that in atrophic gastritis without metaplasia. Immunoglobulin accumulation in the atrophic stomach is a corollary of gastric mucosa inflammatory infiltration by round cells producing immunoglobulins.

1181 A COMPARISON OF THE RADIOSENSITIVITY OF THE GASTRIC MUCOSA AT REST AND DURING STIMULATION.

(E.) Ragins, H. (Albert Einstein Coll. Med., Bronx, New York), M. Fried, R. Dumbro, M. Dittbrenner, S. M. Liu, L. Johnson and L. Sanfilippo. *Amer. J. Dig. Dis.* 12(12):1256-1271, 1967.

Gastric secretion parameters, before, during, and after a 10-day irradiation treatment, were measured in 4 histamine-stimulated (S) and 5 unstimulated (R) mongrel dogs with large gastrostomy cannulas for secretion collection and biopsy; serial histological and histochemical (stainable enzymes) studies of gastric mucosa and secretory volume, free HCl, Na^+, K^+, Cl^-, total protein and pepsin determinations were made. A marked increase in secretion was seen during irradiation, with maximum secretory depression observed 7-14 days after irradiation; all parameters returned to normal 28-46 days after irradiation. There was no difference between R and S dogs. Histological and histochemical irradiation injuries were seen 3-10 days after irradiation; no difference in the radiosensitivity of R and S dogs was revealed. All biopsies were normal in 30-60 days. The radiosensitivity of canine gastric mucosa seems unaltered by its functional secretory state.

1182 BENIGN TUMORS OF THE STOMACH.

(E.) Pena, O. (1101 Valdivia, Casilla, Chile) and J. W. Braasch. *Lahey Clin. Found. Bull.* 17(2):89-95, 1968.

The diagnosis, symptomatology, and conservative management of benign gastric tumors are discussed on the basis of 60 cases (29 men and 31 women, 21-82 yr old) encountered in the course of 3,356 gastric operations performed at the Lahey Clinic between June, 1950 and December, 1965. Of these 60 patients, 34 had leiomyomas ranging in size from 0.5 to 7.0 cm in diameter and up to 128 g in weight (only 2 of the 34 tumors showed ulceration); another 19 patients had adenomatous polyps, mostly in the antrum or pars media, ranging in size from 0.6 to 7.0 cm in diameter and associated with carcinoma *in situ* in 3 cases and with remote gastric carcinoma in another case. Other diagnoses included neurofibroma (2 cases), lipoma (3 cases), aberrant pancreas (1 case) and hamartoma (1 case). Gastrointestinal symptoms of some type were reported by 50 of the 60 patients, but in most cases, these were unrelated to the tumors; only 1 tumor was palpable, 1 caused intermittent obstruction of the pylorus, and 8 produced bleeding. In addition, 12 patients showed associated anemia, 9 of 11 with adenomatous polyps had hypochlorhydria, abdominal X-ray revealed an intraluminal mass in 31 cases and an extraluminal mass in 4, and gastroscopy showed a tumor in 5 of 9 cases. Benign tumors of the stomach should be removed surgically whenever possible, especially because of the frequent association between polyps and carcinoma. Unless the tumor is very small and uncomplicated, surgery should include wide excision of the stomach wall, but on the other hand the gastroesophageal and gastroduodenal junctions should be preserved whenever feasible. Among the 60 personal cases discussed, 21 received a gastrectomy (partial in 18, total in 3); 39 of the group are still living, most of the others having died of unrelated intercurrent diseases.

1183 **CANCER OF THE GASTRIC STUMP: A REPORT OF 30 CASES.** *(Fr.)* Guivarc'h, M. (Foch Med.-Surg. Cent., Suresnes, Paris, France), J. Marquand and A. Mouchet. *Ann. Chir.* 22(5/6):337-342, 1968.

The clinical characteristics, surgical treatment, and prognosis of cancer of the gastric stump are discussed on the basis of 30 cases (10 primary cancers and 20 recurrences) encountered among 621 cases of stomach cancer treated in a 15-yr period. Among the 10 primary cancers (5 limited in extent and 5 involving the entire stump), only 4 fulfilled all 3 of the histologic, chronologic, and topographic criteria proposed for distinguishing between primary and recurrent cancer; i.e., only 4 arose more than 5 yr after a 67% gastrectomy for a definitely benign ulcer in a different part of the stomach. These 10 patients (9 men and 1 woman, 44-73 yr old) had been subjected to partial gastrectomy (Polya in 7 of 10, Finsterer in 3 of 10) for ulcer 5-32 yr before the onset of symptoms (14-32 yr in 6 of 10); symptoms included pain, weight loss, gastrointestinal obstruction, and hemorrhage, and 8 of the 10 cases could be diagnosed radiologically. Among the 20 recurrences (2 limited in extent and 18 involving the entire stump), 14 appeared after a symptom-free interval of less than 2 yr, although 2 were after 5 and 11 yr, resp. Surgery is the only effective treatment for cancer of the gastric stump, but was possible in only 12 of the 30 cases (4 of the 20 recurrences and 8 of 10 primary tumors). An abdominal approach was used in 5 cases and an abdominothoracic approach in 7, and in 5 cases, the gastrectomy was combined with a colectomy. The 5 operative deaths (4 with primary tumors and 1 with a recurrence) were due to cardiorespiratory disorders (2 cases), colonic fistulas (2 cases) and cachexia (1 case). Of the 7 survivors, 4 died in 3-10 months, 1 (with a primary tumor) died after 11 yr, and 2 were alive more than 10 months and more than 7 yr, resp., after surgery. Jejunostomy is of limited value as a palliative procedure for these patients.

1184 **RELATIONSHIP BETWEEN CHANGES IN DIGIT BLOOD FLOW AND THE DUMPING SYNDROME.** *(E.)* Strandness, D. E., Jr. (U. Washington Sch. Med., Seattle) and J. W. Bell. *Ann. Surg.* 166(5):773-777, 1967.

A previous report that digital blood flow was increased before and during the period of symptoms due to the dumping syndrome was not confirmed by a plethysmographic study of 93 patients with various types of gastric operations. In both pre- and postoperative tests, the digit volume pulse amplitude of the finger was monitored before and for 30 min. after ingestion of 150 ml of 50% dextrose (in orange juice). The 35 tested before operation developed no symptoms and most showed vasodilation. Forty postoperative patients experienced no symptoms and showed no consistent pattern relative to digit pulse amplitude. Sixteen developed vasomotor symptoms 25 and 30 min after glucose; while the majority showed vasodilation, the number was not significant. Two of these 16 patients were sufficiently symptomatic to request termination of the test after 20 min.

1185 **CORROSIVE DAMAGE TO STOMACH SIMULATING CARCINOMA. [CASE REPORT]** *(E.)* Kennedy, S. C. (East Birmingham Hosp., England) and A. E. Bavaki. *Brit. Med. J.* 4(5571):93-94, 1967.

1186 **CANCER OF THE STOMACH. A CLINICAL GUIDE FOR DIAGNOSIS AND TREATMENT.** *(E.)* Kelsey, J. R., Jr. Springfield, C. C. Thomas, 1967. 65 pp.

1187 **DUPLICATION OF THE STOMACH ASSOCIATED WITH NONROTATION OF THE GUT.** *(E.)* Klidjian, A. (Royal AF Hosp., Cosford, Wolverhampton, Staffs., England) and P. D. Sutton. *Brit. J. Surg.* 54(8):731-735, 1967.

1188 **RENAL AMYLOIDOSIS ASSOCIATED WITH GASTRIC CARCINOMA. [CASE REPORT]** *(E.)* Acland, J. D. (Gen. Hosp., Nottingham, England), H. M. T. Hossein and E. Jackson. *Brit. Med. J.* 1(5584):99-100, 1968.

1189 **CEREBELLAR DEGENERATION IN ASSOCIATION WITH CARCINOMA OF THE STOMACH. [CASE REPORT]** *(E.)* Balla, J. I. (Prince Henry's Hosp., Melbourne, Australia). *Brit. Med. J.* 1(5583):34, 1968.

1190 **CARCINOMA OF THE GASTRIC STUMP: CONSIDERATIONS ON ITS FREQUENCY IN AUTOPSY MATERIAL.** *(It.)* Stipa, S. *Arch. Atti Soc. Ital. Chir.* pp. 602-606. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967. 627 pp.

1191 **THE ABSORPTION OF PROTEINS AND LIPIDS FOLLOWING GASTRIC RESECTION.** *(It.)* Stipa, S., C. Brondi, A. Cavallaro and L. Privitera. *Arch. Atti Soc. Ital. Chir.*, pp. 594-596. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967. 627 pp.

1192 **OBSERVATIONS ON CALCIUM METABOLISM FOLLOWING GASTRIC RESECTION.** *(It.)* Stipa, S., G. Alessi and L. Navarria. *Arch. Atti Soc. Ital. Chir.*, pp. 591-593. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967. 627 pp.

1193 **COMMENTS ON THE SURGICAL TECHNIQUE FOR GASTRIC RESECTION.** *(It.)* Scaravelli, C. *Arch. Atti Soc. Ital. Chir.*, pp. 572-573. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E. M.E.S., 1967. 627 pp.

1194 MEASUREMENT OF GASTRIC SECRETION BY MEANS OF THE INSULIN TEST. *(It.)* Picardi, C. and G. M. Daniele. *Arch. Atti Soc. Ital. Chir.*, pp. 549-561. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967. 627 pp.

1195 ANATOMICAL AND HISTOLOGICAL DATA ON THE PREOPERATIVE DEMARCATION OF THE GASTRIC ANTRUM: A PRELIMINARY NOTE. *(It.)* Occhionero, R. and S. Scripilliti. *Arch. Atti Soc. Ital. Chir.*, pp. 527-530. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967. 627 pp.

1196 "CARCINOMA *IN SITU*" OF THE STOMACH. *(It.)* Marciani, A., N. Casale and E. Gentileschi. *Arch. Atti Soc. Ital. Chir.*, pp. 510-516. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967. 627 pp.

1197 HISTOCHEMICAL FINDINGS ON THE EPITHELIAL MUCINS OF THE STOMACH. *(It.)* Gentileschi, E., A. Marciani and N. Casale. *Arch. Atti Soc. Ital. Chir.*, pp. 471-481. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967. 627 pp.

1198 A MODERN TECHNIQUE FOR THE STUDY OF THE SECRETORY FUNCTION OF THE STOMACH: RADIOMETRIC DETERMINATION OF GASTRIC pH. *(It.)* Di Matteo, G. and L. Gioffrè. *Arch. Atti Soc. Ital. Chir.*, pp. 452-453. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967. 627 pp.

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1243 **HISTOPATHOLOGICAL STUDY ON SUPERFICIAL SPREADING TYPE OF EARLY GASTRIC CANCER.** *(E.)* Iwanaga, T., G. Kosaki, H. Taniguchi and A. Wada. *Jap. J. Cancer Clin.* 13(5):238-248, 1967.

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1245 **URINARY EXCRETION OF CALCIUM AND PHOSPHORUS FOLLOWING GASTRECTOMY: AN EXPERIMENTAL STUDY IN RATS.** *(E.)* Birnbaum, D. (Hadassah U. Hosp., Jerusalem), J. Menczel and Z. Eyal. *Israel J. Med. Sci.* 4(1):152-154, 1968.

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1246 **RETROANASTOMOTIC HERNIA AFTER GASTRIC RESECTION.** *(It.)* Leone, A. (Inst. Gen. Clin. Surg., U. Naples, Italy). *Chir. Gastroent.* 2(1):58-75, 1968.

A 44-yr-old woman presented with acute small intestinal obstruction 8 months after gastrectomy and gastrojejunostomy (technique of Reichel-Polya) for duodenal ulcer. Laparotomy revealed herniation of the entire small intestine from left to right through the opening created by the anastomosis, as a result of which the terminal loop of the ileum was suspended between the cecum and the neostomy. Despite corrective surgery, the patient died in shock. This was the first such case encountered in 276 operations, giving an incidence of 0.3%; the incidence reported in the literature varies from 0.15 to 2.5%, the total number of cases reported being 111, including 69 after gastrojejunostomy alone. A review of the literature on the etiology and pathological anatomy of this complication indicates that the efferent loop is most commonly involved, herniation proceeding from right to left; herniation of the afferent loop is seen mostly after antecolic and antiperistaltic anastomosis. The prognosis is poor (mortality of 32-50%), and the herniation can still occur many yr after gastroenterostomy. In order to prevent this type of internal hernia, it is recommended that the mesocolon be breached as far back as possible, close to the origin of the transverse colon. In addition, after the left edge of the mesocolic opening has been sutured to the posterior wall of the stomach, but before the latter, which is still in place, has been sutured to the jejunum, the first or afferent loop of the jejunum is sutured to the origin of the mesocolon and to the posterior wall of the stomach, bringing it gradually up to the lesser curvature (or the greater curvature in the case of an isoperistaltic anastomosis). Using this technique, no further complications were encountered in the next 321 cases. 47 refs.

1247 **COMPLICATIONS OF DUODENITIS (PYLORODUODENITIS).** *(Rus.)* Treskunov, K. A. *Sovet. Med.* (2):63-67, 1968.

Follow-up studies in three groups of patients with duodenitis seen in the period 1953-63 (including 395 followed for 3 yr, 162 followed for 7 yr and 267 followed for 10 yr) revealed complications of various types. Periduodenitis, for example, was observed in 9-12%, but mention is made of the fact that periduodenitis may be symptomless in 40-50% of the cases. Pyloroduodenal stenosis developed in 0-2%; although stenosis is usually a complication of peptic ulcer, it can occur in the absence of ulceration. Perforation, on the other hand, which was seen in 1-2%, is definitely a complication of ulcer and not of duodenitis *per se.* With regard to peptic ulcers, these were encountered in about 9% of all three groups. Since there was no increase in the incidence of ulcers with increasing observation time, and since no ulcers were observed among at least 75% of the patients (the 25% who were cured, the 32% who improved, and the 18% who showed a stationary course during the observation period), it is concluded that duodenitis is not a stage in the development of ulcer. Other complications seen included cholangiitis (due to insufficiency of the sphincter of Oddi), obstructive jaundice (in cases of involvement of the ampulla of Vater), pancreatitis, hemorrhage, and a syndrome involving morning sickness, loss of appetite, weakness, migraine headache and dizziness which develops primarily in young wome and which is ascribed to disruption of the normal endocrine functions of the duodenum. The neurogenic and cardiovascular symptoms in these cases disappear after effective treatment of the duodenitis.

1248 **INTERMITTENT ANGIOSCLEROTIC INTESTINAL DYSPRAGIA OR ABDOMINAL ANGINA AS AN ACUTE SYNDROME.** *(Ger.)* Gessner, J. (Agricola Hosp., Saalfeld/Saale, Germany) and K. Schmidt. *Zbl. Chir.* 93(3):109-116, 1968.

On the basis of personal experience with 10 cases (6 men and 4 women, 55-81 yr old), only 3 of whom were admitted and diagnosed early enough in the disease to be saved, abdominal angina is characterized as a highly painful and rapidly fatal syndrome caused by a deficient blood flow in the area of the superior mesenteric artery. The typical findings are intermittent, severe, postprandial pain, developing 30-60 min after eating and lasting 3-4 hr, together with a malabsorption syndrome, weight loss, and vascular murmurs in the upper abdomen and to the left of the navel. The diagnosis, however, is difficult and can be confirmed only by aortography. As a result, treatment is usually impossible, although in theory the condition can be corrected by thrombendarterectomy, aorto-mesenteric bypass, or resection of the gangrenous intestine if the remaining intestinal circulation is still adequate. Among the authors' 10 cases, 9 were due to arteriosclerosis and 1 to embolism. Seven died shortly after admission, 2 were treated conservatively (infusion of glucose, saline, vasodilators, antibiotics, and vitamins), and one was treated by resection of the ileum.

1249 **GALLSTONE ILEUS.** *(Ger.)* Becker, H. (Northwest Hosp., Frankfurt/M.-Praunheim, Germany) and E. Marz. *Fortschr. Med.* 86(7):285-288, 1968.

The incidence, pathogenesis, symptoms, diagnosis, and treatment of gallstone ileus are discussed on the basis of experience with 10 cases (9 women and 1 man, average age 66 yr) seen during the period 1963-67. This represents 10 out of 2,030 operations for gallstones and 10 out of 160 cases of mechanical obstruction of the intestine seen during this period. Six of these 10 cases had jejunal obstruction and 4 ileal; 8 had a long history of cholelithiasis and cholecystitis. The gallstones, all of which were removed surgically, were up to a hen's egg in size. The principal initial symptoms were vomiting and abdominal colic, followed by the typical symptoms of intestinal obstruction, which had been present for 4-8 days before admission. Three of the patients died postoperatively, 2 of pulmonary embolism and one of a thyrotoxic crisis. Particular emphasis is given in the accompanying review to the radiological diagnosis of gallstone ileus, and attention is called to the significance of air in the biliary tract and a finding of basal, lamelli-form, right-sided pulmonary atelectasis. The preferred treatment is enterotomy, and it is suggested that many cases could be prevented by prompt treatment of cholelithiasis.

1250 **EFFECT OF GLUTEN-FREE DIET ON DERMATOLOGICAL, INTESTINAL, AND**

SMALL INTESTINE

HEMATOLOGICAL MANIFESTATIONS OF DERMATITIS HERPETIFORMIS. *(E.)* Fry, L. (London Hosp., England), R. M. H. McMinn, J. D. Cowan and A. V. Hoffbrand. *Lancet* 1(7542):557-561, 1968.

Small intestine morphology, fecal fat levels, blood hemoglobin and reticulocyte counts, bone marrow cell counts, serum vitamin B_{12}, serum and red-cell folate levels, *Lactobacillus casei* inhibitory factor, plasma iron, and iron-binding capacity were the parameters investigated before and 6 months after commencement of a gluten-free diet in 7 dermatitis herpetiformis patients receiving diaphenylsulfone(dapsone). Improved nutritional status was seen in 4 out of 7 patients the second or third month after diet initiation; only 2 showed appreciable weight gain, although 5 did gain some weight. Only 1 patient showed improved skin condition while on gluten-free diet without dapsone treatment. After 6 months on the diet, dapsone was discontinued in 2 patients and the dose reduced in 3 others. The gluten-free diet reduced fecal fat in 5 patients. Improved intestinal morphology, abnormal before the diet, was observed in 3 patients; increased villous height was seen in 5 patients. Serum folate rose in 6 out of the 7 patients and red-cell folate rose in 3 out of the 4 in whom the levels had been subnormal. The results suggest that the enteropathy in dermatitis herpetiformis is due to gluten sensitivity, and that the skin lesions are related to the enteropathy.

1251 **JEJUNAL TRAUMA FOLLOWING PERFUSION OF THE SMALL INTESTINE IN NONTROPICAL SPRUE.** *(E.)* Schmid, W. C. (Mayo Grad. Sch. Med., U. Minnesota, Rochester), S. F. Phillips and W. H. J. Summerskill. *Gastroenterology* 54(3):417-420, 1968.

The case histories of 2 nontropical sprue patients who experienced small intestine perforation following perfusion studies are presented. The lower jejunum was perfused with isotonic solutions of sodium, potassium, chloride, and bicarbonate. A causal relationship between perfusion and perforation is proposed because of the close time relationship. Intestinal mucosa aspiration by suction tube, intussusception after intubation, intestinal trauma following balloon inflation, or potassium infusion may contribute to intestinal perforation in nontropical sprue patients, who seem to be more highly susceptible to intestinal perforation than patients with other gastrointestinal disorders.

1252 **EXPERIMENTAL BOWEL ISCHEMIA.** *(E.)* Ranniger, K. (Dept. Med., U. Chicago, Illinois) and D. L. Scheiner. *Arch. Surg.* 95(5):768-770, 1967.

Small bowel ischemia was produced in dogs by the injection of 0.1-1.2 mm lead pellets into the superior mesenteric artery, catheterized via the femoral artery; vascular occlusion, checked radiographically, depended on pellet size and number. Decreased peristaltic activity indicated altered bowel functional capacity; absorption abnormalities and histological changes were detected later. Vascularization improved 24 hours after ischemia, but failed to return to normal, even after 1 year.

1253 **MALIGNANT TUMOURS OF THE SMALL INTESTINE (A TEN-YEAR SURVEY).** *(E.)* Brookes, V. S. (Queen Elizabeth Hosp., Birmingham, England). *Proc. Roy. Soc. Med.* 61(3):216-217, 1968.

A review of cases reported to the Birmingham Regional Cancer Registry for the period 1950-59 revealed 5,441 carcinomas of the stomach, 8,966 carcinomas of the colon and rectum, and 168 malignancies of the small intestine, including 55 carcinomas, 56 sarcomas, 32 carcinoid tumors (all of which should be looked upon as low-grade malignancies), and 25 in which the histology was unknown. The duration of symptoms before treatment in these patients varied from 1.7 months in sarcoma to 2.7 months in carcinoma and 7.2 months in carcinoid. Carcinoma was evenly distributed through the small intestine, but the 9 patients who survived 5 yr or longer (out of 28 who could be given radical surgery) included 8 of the 37 cases with carcinoma of the jejunum or ileum and only 1 of the 18 cases with duodenal cancer. The sarcomas included 29 reticulosarcomas, 11 lymphosarcomas, 13 leiomyosarcomas, and 3 of unspecified type; reticulo- and lymphosarcoma were more common in the lower segments of the small intestine. Among 31 patients who received radical surgery (plus radiation in 14 of 31), 13 survived for 5 yr or longer; most of the patients who died, however, died in the first 2-3 yr after surgery. Carcinoid tumors were found mostly in the ileum; 13 of 31 patients who could be followed survived 5 yr or longer, including 9 of the 16 subjected to radical surgery.

1254 **THE COMPLICATIONS OF PRIMARY DUODENAL DIVERTICULA.** *(E.)* Nall, R. (Traralgon, Victoria, Australia). *Aust. New Zeal. J. Surg.* 37(3):289-293, 1968.

The complications which may arise in duodenal diverticula can be classified into those due to stasis and infection, those due to mechanical effects such as compression of the bile duct or pancreatic duct or duodenal obstruction, and those following surgical excision. Four illustrative cases are presented (women, over 60 yr of age) in which duodenal diverticula were accompanied by 1) symptoms of pyloric stenosis followed by obstruction due to an enterolith and eventual fatal peritonitis; 2) pancreatitis and a diverticulum of the colon; 3) steatorrhea and colonization of the duodenum with coliform bacilli; and 4) subphrenic abscess following surgical excision. It is pointed out that such complications are rare, and that primary duodenal diverticula usually lack specific symptoms. It is concluded that malabsorption resulting from duodenal diverticulosis is best treated conservatively, since surgery in such cases is hazardous.

1255 **ALKALINE PHOSPHATASE LEVELS IN NORMAL AND DISEASED SMALL BOWEL.** *(E.)* Ferguson, A. (U. Dept. Med., Royal Infirm., Glasgow, Scotland), W. C. Watson, J. D. Maxwell and G. S. Fell. *Gut* 9(1):96-98, 1968.

Alkaline phosphatase levels were determined by a modified method of Kind and King (*J. Clin. Path.* 7:322-326, 1954) in specimens of normal and abnormal human jejunum obtained by biopsy (Crosby capsule) from the first 10 cm of the jejunum. In histologically normal tissue from 30 patients (8 men and 22 women, 18-68 yr old) with a variety of diseases not affecting the small intestine, in which the disaccharidase activity was normal, the alkaline phosphatase activity was 60-269 K.A. U/g (mean 162 ± 59). In 22 patients with celiac disease (16 cases), rosacea, Crohn's disease, Whipple's disease, mesenteric ischemia or dermatitis herpetiformis, in which the jejunum showed partial or subtotal villous atrophy and deficiencies of lactase, maltase, and sucrase, the alkaline phosphatase activity was 9-85 K.A. U/g (mean 25 ± 19), and only 1 specimen showed an activity greater than 60 K.A. U/g. Intermediate levels of alkaline phosphatase were found in jejunal specimens with mucosal ridges under the dissecting microscope but fairly normal appearance on section, especially when combined with a disaccharidase deficiency. Villous atrophy is concluded to be the most direct cause of diminished intestinal alkaline phosphatase, but the enzyme levels may also be depleted in histologically normal tissue in association with other diseases.

1256 SEVENTEEN PATIENTS WITH PEUTZ-JEGHERS SYNDROME IN FOUR GENERATIONS. *(E.)*

McAllister, A. J. (U. Utah Coll. Med., Salt Lake City), N. F. Hicken, R. G. Latimer and V. R. Condon. *Amer. J. Surg.* 114(6):839-843, 1967.

Case reports are presented for a 35-yr-old man, followed since the age of 17, and his two children (14-yr-old boy and 11-yr-old girl), all of whom showed a typical Peutz-Jeghers syndrome with melanotic pigmentation of the lips and oral mucosa and small intestinal polyposis manifested by recurrent intussusception and requiring surgical excision. The 14 other members of the kindred analyzed included the first patient's brother and sister and their 7 children, as well as the patient's mother, two aunts, an uncle, and the maternal grandmother. All 8 members of the 3 older generations and 6 of 9 in the 4th generation showed the typical pigmentation, and polyps were detected in each generation (all members of the first and second, one of three in the third, and 2 of 9 in the 4th). The hereditary factor is concluded to be a Mendelian dominant which affects most members of the family regardless of sex. The polyps usually grow rapidly during adolescence, but do not develop in adulthood if excised earlier. Polyps in the jejunum and ileum can be removed by simple excision since they apparently rarely undergo malignant change, but gastric or duodenal polyps present present a more serious problem unless proven benign.

1257 *IN VIVO* EFFECT OF POTASSIUM ON SMALL BOWEL. *(E.)*

(Dept. Surg. Lankenau Hosp., Philadelphia, Pa.), C. E. Brown and J. M. Deaver. *Ann. Surg.* 166(4):693-703, 1967.

The acute local effects of hypertonic (7%) potassium chloride and hypertonic (5%) sodium chloride, and isotonic sodium chloride were studied in isolated, *in situ* segments of bowel with intact blood supply. Small bowel of 16 patients and large bowel of 4 patients were studied during elective resection for cancer. Solutions were kept in the lumen for 30-85 min. Both hypertonic solutions produced gross and microscopic evidence of acute cellular injury in all layers of the bowel wall. These changes are consistent with what is seen in the early stages of primary nonspecific ulceration of the small bowel. The pathogenesis of this lesion is discussed.

1258 MASSIVE GASTROINTESTINAL HEMORRHAGE DUE TO JEJUNAL DIVERTICULOSIS. *(E.)*

Thompson, R. J., Jr. (Loma Linda U. Sch. Med., Calif.), W. Ostermiller, Jr., G. R. Turner and J. K. Longerbeam. *Amer. J. Gastroent.* 49(2):135-145, 1968.

Three cases of massive gastrointestinal hemorrhage due to jejunal diverticulosis are presented. In one case the jejunum showed an ulcer in the base of a diverticulum with an eroded vessel. All experienced melena and in one patient, hematemesis as well. One of these 3 survived. Review of the literature reveals approximately 33 patients with mild to massive bleeding. Thirteen may be classified as having massive hemorrhage so that the present 3 cases brings the total to 16. Treatment consisted of resection of the affected area and end-to-end anastomosis in 13 patients, displacement of a concretion in one, and in two patients the diagnosis was made at autopsy. Twelve of the 16 patients lived.

1259 COARSE MUCOSAL FOLDS IN THE DUODENUM. *(E.)*

Rhodes, J. (Royal Infirmary, Cardiff, Wales), K. T. Evans, J. H. Lawrie and A. P. M. Forrest. *Quart. J. Med.* 37(145):151-169, 1968.

Forty patients are described with coarse duodenal folds on radiological examination; 15 had a duodenal ulcer and two developed an ulcer subsequently. A syndrome is described which consists of dyspepsia, coarse duodenal folds, a high acid secretion, and inflammatory changes in the duodenal mucosa with 'gastric-type' epithelium. The symptoms and acid secretion were similar to those in patients with duodenal ulcer. The severity of the coarse folds and the histological changes were related to acid secretion. It is suggested that the high duodenal acidity in patients with coarse duodenal folds is responsible for the symptoms, the radiological changes, and histological abnormalities. Previous accounts of duodenitis and hyperplasia of Brunner's glands probably refer to the same syndrome.

1260 EFFECT OF VAGOTOMY UPON THE SMALL INTESTINE. *(E.)*

Bejar, J. (Harvard Med. Surg. Svc., Boston City Hosp., Mass.), S. A. Broitman and N. Zamcheck. *Gut* 9(1):87-90, 1968.

The effects of bilateral vagotomy on the villus architecture and mitotic activity of the crypts of the small intestinal mucosa were studied and correlated with xylose and fat absorption in 6 patients (5 men and 1 woman, 38-62 yr old) with duodenal (5 of 6) or marginal ulcers. Two of the patients had had previous gastroenterostomies, and in the other 4 vagotomy was combined with pyloroplasty (1 of 4), antrectomy (1 of 4) or hemigastrectomy (2 cases). All patients complained of epigastric fullness, weight loss and diarrhea (5 of 6) or steatorrhea (1 of 6) during the first 6 postoperative weeks. Nevertheless, normal xylose absorption values were obtained in 5 of 6 cases. The diarrhea was self-limiting within 6 weeks and was not associated with morphological changes in the small intestine as seen by light microscopy. There was no significant change in either the villus/crypt ratio (2.6-2.8) or the number of mitoses per 100 crypt cells (1.6) in jejunal biopsies obtained with the Carey capsule. The appearance of all the biopsy specimens was normal except for a moderate increase in round-cell infiltration in two patients. Renewal of the mucosal epithelium in man does not appear to be under the direct influence of the preganglionic parasympathetic nervous system.

SMALL INTESTINE

1261 **DIRECT MEASUREMENT OF THE RATES OF SYNTHESIS OF PLASMA PROTEINS IN CONTROL SUBJECTS AND PATIENTS WITH GASTROINTESTINAL PROTEIN LOSS.** *(E.)* Wochner, R. D. (Washington U. Med. Svc., St. Louis City Hosp., Mo.), S. M. Weissman, T. A. Waldmann, D. Houston and N. I. Berlin. *J. Clin. Invest.* 47(5):971-972, 1968.

A method is described for determining the instantaneous synthetic rate of plasma proteins by "pulse labeling" the hepatic arginine pool with ^{14}C-bicarbonate and measuring the specific activity of the urinary urea, the plasma volume and plasma protein concentration, the specific activity of the arginine guanido carbon of the protein under investigation, and the fraction of newly synthesized protein which is within the plasma compartment at the time the specific activity is measured. Measurements were carried out on 5 patients (2 men and 3 women, 27-43 yr old) with gastrointestinal protein loss (5.1-19.6% of injected ^{51}Cr-albumin recovered in the 4-day feces) due to intestinal lymphangiectasia (4 of 5) or regional enteritis (1 of 5) and plasma protein levels of 3.8-4.3 g%, and on 7 controls (males, 46-78 yr old) with amyotrophic lateral sclerosis (4 of 7) or chronic leukemia (3 of 7) and plasma protein levels of 6.2-8.0 g%. Each subject received 100 μC of NaH^{14} CO$_3$ and 15-30 μC of ^{131}I-albumin simultaneously i.v. and plasma samples were obtained at intervals over the next 21 days. There was a close similarity between the average catabolic rate (as measured by radioiodinated serum albumin) and the instantaneous synthetic rate (measured with radiocarbon) of plasma albumin, confirming the accuracy of the method and indicating that there is relatively little fluctuation in the rate of albumin synthesis with time. The accuracy of the radiocarbon technique was also confirmed by the rapid decline in the specific activity of expired CO$_2$ and by the decline in the specific activity of urinary urea as a single exponential. The instantaneous synthetic rate of albumin was 5.8 mg/kg/hr in controls and 7.2 mg/kg/hr in patients with gastrointestinal protein loss. The catabolic rate (^{131}I) was 6.1 mg/kg/hr in controls and 8.7 mg/kg/hr in patients. However, since the size of the albumin pool was smaller in these patients, this corresponded to a much larger difference in fractional catabolic rate (0.39% of the plasma pool per hr in controls and 1.18%/hr in the patients), indicating that the liver was probably synthesizing albumin at or near maximal capacity. Fibrinogen (the average levels of which were only 13% lower in the patients) was synthesized at a rate of 3.2 mg/kg/hr or 1.8% of the pool per hr (compared to 1.9 mg/kg/hr or 1% of the pool per hr in controls). Transferrin synthesis was much more variable but averaged 0.24 mg/kg/hr (0.4% of the pool) in controls and 0.31% mg/kg/hr (0.47% of the pool) in the patients. Gastrointestinal protein loss and hypoalbuminemia are thus compensated for by significant increases in the protein-synthesizing activity of the liver.

1262 **CLINICAL OBSERVATIONS ON CARCINOID TUMORS OF THE SMALL INTESTINE.** *(It.)* Marrano, D., F. Maghetti and P. Descovich. *Arch. Atti Soc. Ital. Chir.*, pp. 295-299. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967. 627 pp.

1263 **INTESTINAL OCCLUSION DUE TO CARCINOID TUMORS OF THE SMALL INTESTINE.** *(It.)* Tevenè, A. M. and G. C. Mainardi. *Arch. Atti Soc. Ital. Chir.*, pp. 330-332. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967. 627 pp.

1264 **HISTOCHEMICAL OBSERVATIONS ON THE MUCUS-SECRETING ELEMENTS OF THE DUODENUM.** *(It.)* Gentileschi, E., A. Marciani and N. Casale. *Arch. Atti Soc. Ital. Chir.*, pp. 482-489. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967. 627 pp.

1265 **LEIOMYOSARCOMA OF MECKEL'S DIVERTICULUM.** *(Ger.)* Sailer, R. (Essen Clin., Ruhr U., W. Germany), H. Böhme and G. Jacobs. *Deutsch. Med. Wschr.* 93(10):446-450, 1968.

1266 **FUNCTION OF THE DUODENUM AND RESULTS OF ASPIRATION DUODENOBIOPSY IN PATIENTS WITH DIABETES MELLITUS.** *(Rus.)* Makos, R. P. (Ivano Franko Med. Inst. Leningrad, USSR). *Ter. Arkh.* 40(2):39-43, 1968.

1267 **GIANT DUPLICATION OF THE JEJUNUM: CASE REPORT.** *(E.)* Alley, S. (Louisiana State U. Sch. Med., New Orleans), S. Karlin and M. B. Myers. *Amer. Surg.* 34(1):105-108, 1968.

1268 **SUPERIOR MESENTERIC VEIN THROMBOSIS COMPLICATING PANCREATODUODENECTOMY: SUCCESSFUL TREATMENT BY THROMBECTOMY. [CASE REPORT]** *(E.)* Mergenthaler, F. W. (New York U. Med. Ctr., N. Y.) and M. N. Harris. *Ann. Surg.* 167(1):106-111, 1968.

1269 **HODGKIN'S DISEASE OF THE JEJUNUM: PERFORATION DURING RADIATION THERAPY. [CASE REPORT]** *(E.)* Conger, J. D. (Naval Hosp., Great Lakes, Ill.), D. O. Castell and W. J. Jacoby, Jr. *Arch. Int. Med.* 121(2):174-176, 1968.

1270 **MULTIPLE PHLEBECTASIA OF THE JEJUNUM, ORAL CAVITY, AND SCROTUM. [CASE REPORT]** *(E.)* Miller, D. A. (Colorado Gen. Hosp., Denver) and W. A. Akers. *Arch. Int. Med.* 121(2):180-182, 1968.

1271 **REDUPLICATION OF THE ILEUM: SURGICAL COMPLICATIONS. [CASE REPORT]** *(E.)* Richards, R. D. (Royal Gwent Hosp., Newport, Mon., England) and D. A. Aubrey. *Brit. J. Surg.* 54(11):966-969, 1967.

1272 **HEMANGIOMA OF THE SMALL INTESTINE. [CASE REPORT]** *(E.)* Bilton, J. L. (Huron Rd. Hosp., Cleveland, Ohio) and M. Riahi. *Amer. J. Gastroent.* 48(2):120-124, 1967.

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1273 **SEROSAL PATCH GRAFTING FOR CLOSURE OF POSTERIOR DUODENAL DEFECTS.** *(E.)* Bender, H. W. (Johns Hopkins U. Sch. Med., Baltimore, Md.), J. Sebor and G. D. Zuidema. *Amer. J. Surg.* 115(1):103-107, 1968.

1274 **CASE OF CRONKHITE-CANADA SYNDROME WITH ASSOCIATED JEJUNAL DIVERTICULOSIS.** *(E.)* Cunliffe, W. J. (U. Newcastle upon Tyne, England) and J. Anderson. *Brit. Med. J.* 4(5579):601-602, 1967.

1275 **A CASE OF URETERO-ILEAL FISTULA.** *(E.)* Critchley, C. F. (London, England). *Brit. J. Surg.* 54(9):812-813, 1967.

1276 **CHIRURGIE DE L'INTESTIN GRÊLE ET DU MÉSENTERE (SURGERY OF THE SMALL INTESTINE AND THE MESENTERY).** *(Fr.)* Roux, M. (Vaugirard Hosp., Paris, France). Paris, Masson & Co., 1967. 452 pp.

1277 **ARTERIOMESENTERIC DUODENAL OBSTRUCTION. [TWO CASES]** *(E.)* Pallette, E. M. (St. Vincent's Hosp., Los Angeles, Calif.), R. W. Harrington and E. C. Pallette. *Amer. Surg.* 34(2):145-150, 1968.

1278 **TEMPORARY ENTEROSTOMY.** *(Ger.)* Widmer, A. (Canton Hosp., Aarau, Switzerland). *Helv. Chir. Acta* 35(1/2):74-77, 1968.

1279 **INTESTINAL OCCLUSION DUE TO A TUMOR OF THE JEJUNUM. [TWO CASES]** *(Sp.)* Castellon, R. *Cir. Ginec. Urol.* 21(6):501-503, 1967.

1280 **ILEAL INTUSSUSCEPTION IN THE ADULT DUE TO INFLAMMATORY FIBROID POLYPS.** *(E.)* Kerr, W. H. (Stanford U. Sch. Med. Palo Alto, Calif.) and J. B. D. Mark. *Surgery* 63(4):604-608, 1968.

1281 **TRANSDUODENAL PAPILLECTOMY FOR CANCER OF THE DUODENAL PAPILLA.** *(Rus.)* Shubin, B. M. (Moscow Municipal Hosp. No. 62, USSR) and Ye. S. Futoryan. *Khirurgiia (Moskva)* 44(1):60-63, 1968.

1282 **CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL: CASE 7-1968: DIARRHEA OF LONG DURATION IN AN ELDERLY MAN.** *(E.)* Kranes, A. (Massachusetts Gen. Hosp., Boston) and R. E. Scully. *New Eng. J. Med.* 278(7):385-391, 1968.

1283 **ANEMIA DUE TO NONSPECIFIC ILEAL ULCERATION. [CASE REPORT]** *(E.)* Walker, C. O. (USAF Hosp., Tyndall Air Force Base, Fla.) and O. A. Sorsdahl. *Southern Med. J.* 61(2):127-128, 1968.

1284 **INTUSSUSCEPTION: A LATE COMPLICATION OF SMALL-BOWEL BYPASS FOR OBESITY. [CASE REPORT]** *(E.)* Kaufmann, H. J. (North. Westchester Hosp., Mt. Kisco, N. Y.) and H. W. Weldon. *J.A.M.A.* 202(13): 1147-1148, 1967.

1285 **ACUTE DIVERTICULITIS OF THE TERMINAL ILEUM. [CASE REPORT]** *(E.)* Bartone, N. F. (Methodist Hosp., Brooklyn, N. Y.) and R. V. Grieco. *J.A.M.A* 202(12):1103-1105, 1967.

1286 **ACUTE DIVERTICULITIS OF THE TERMINAL ILEUM.** *(E.)* Cocks, J. R. (King George Hosp., Ilford, London, England) and F. J. Zino. *Brit. J. Surg.* 55(1): 45-49, 1968.

1287 **ACUTE RADIATION DAMAGE TO THE DIGESTIVE TRACT: A COMPARISON OF EFFECTS BETWEEN FAST NEUTRONS AND X-RAYS.** *(E.)* Hirose, F. (Res. Inst. Nucl. Med. Biol., Hiroshima U., Japan). *Acta Path. Jap.* 17(3):324-327, 1967.

1288 **DIVERTICULA OF THE DUODENAL BULB.** *(Fr.)* Gutmann, R. A., T. Schops and H. Hamel. *Presse Med.* 75(Suppl. 43):1-4, 1967.

1289 **ASSOCIATION OF NEPHROTIC SYNDROME WITH INTESTINAL LYMPHANGIECTASIA.** *(E.)* Salazar de Sousa, J. (Pediat. Clin., U. Lisbon, Portugal), O. Guerreiro, A. Cunha and J. Araujo. *Arch. Dis. Child.* 43(228) 245-248, 1968.

1290 **HODGKIN'S DISEASE OF THE JEJUNUM.** *(E.)* Conger, J. D. (Naval Hosp., Great Lakes, Ill.), D. O. Castell and W. J. Jacoby. *Arch. Intern. Med.* 121(12):174-176, 1968.

1291 **OBSTRUCTION OF THE SMALL INTESTINE DUE TO RETRACTILE MESENTERITIS.** *(E.)* Aach, R. D. (Washington U. Sch. Med., St. Louis, Missouri), L. I. Kahnand, R. S. Frech. *Gastroenterology* 54(4): 594-598, 1968.

1292 **LIPOHYPERPLASIA OF THE ILEOCECAL VALVE.** *(E.)* Elliott, G. B. (U. British Columbia), J. T. M. Sandy, K. A. Elliott and A. Sherkat. *Canad. J. Surg.* 11(2):179-187, 1968.

1293 **VASCULAR OBSTRUCTION OF THE DUODENU FOLLOWING EXTRAPERITONEAL ILEOSTOMY** *(E.)* Brockis, J. G. (U. Western Australia). *Aust. and New Zealand J. Surg.* 37(3):294-296, 1968.

1294 **ACUTE SMALL BOWEL OBSTRUCTION.** *(E.)* Thomas, D. (Melbourne, Australia). *Aust. and New Zealand J. Surg.* 37(3):302-309, 1968.

1295 **DUODENAL OCCLUSIONS OF THE NEONATE CAUSED BY ROTATION AND FIXATION ANOMALIES (DESCRIPTION OF SIX CASES).** *(It.)* Fantoni, P. A. (U. Modena, Italy), G. Caramia and A. Peracchia. *Minerva Chir.* 23(3):122-131, 1968.

See also abstract nos.: 922,923,925,1022,1619

Peptic Ulcer

1296 GANGLIOPLEGIC DRUGS AND DESOXYCORTICOSTERONE ACETATE IN THE COMPLEX THERAPY OF PEPTIC ULCER DISEASE. *(Rus.)* Brezhnev, V. S. (Novogol'yelansk Dist. Hosp., USSR). *Sovet. Med.* (2):80-82, 1968

The effects of the 3 ganglioplegic drugs Kvateron, Fubromegan and Arpenal; desoxycorticosterone acetate (DOCA; 2 ml 0.5% solution i.m. daily x 5, then every 2 days for a total of 20 injections in 35-37 days); and a combination of DOCA and Fubromegan (0.5-1.0 ml 2% solution s.c. 3 times daily in increasing doses for 3 weeks) were assayed in 130 patients (112 men and 18 women, most 20-55 yr old) with chronic peptic ulcers (30 gastric and 104 duodenal) of from less than 5 yr (69 of 130) to more than 10 yr (27 of 130 duration. [Kvateron = ammonium, triethyl((3-hydroxy-2-methylbutyl)-, iodide, p-butoxybenzoate; Fubromegan = ammonium diethyl-(3-hydroxybutyl)-methyl-, iodide, 5-bromo-2-furoate; Arpenal = Acetamide, N-[3-(diethylamino)propyl]-2,2-diphenyl-, hydrochloride.] When one or more the ganglioplegic drugs was given to 77 representative patients for 3-4 weeks, pain disappeared in 60 of 77 (and decreased in 12 others), dyspepsia disappeared in 68 of 77 (decreased in 5 others), the feces continued to show the presence of blood in only 3 of 28 cases, and the acidity and peptic activity of the gastric juice tended toward normal. The immediate results were thus satisfactory, but 30 patients showed residual deformation due to the healed ulcer, and 35 of 72 had a recurrence within the first yr. Pain and dyspepsia disappeared in all of 17 other patients who received DOCA alone and only one showed residual deformation, although 7 experienced a recurrence. Among the 36 other patients who received combined therapy, pain and dyspepsia both disappeared in 31 (decreased in 3), the feces continued to show signs of blood in only 3 of 25 cases, and body weight increased by 2.5-6 kg; although 16 of the 36 showed residual deformation, only 11 experienced a recurrence during the first yr. Among the 53 patients receiving DOCA, either alone or with Fubromegan, the acidity and peptic activity of the gastric juice increased in 14, decreased in 13, and remained unchanged in 26 cases. Although DOCA is generally recommended for the treatment of chronic ulcers, it is contraindicated in allergic states, severe cerebrovascular or coronary disease, hypertension or edema.

1297 THE HEMOCOAGULATION SYSTEM IN PATIENTS WITH GASTRODUODENAL ULCER DURING THE PHASE OF EXACERBATION. *(Rus.)* Voronina, L. N. (Cent. Inst. Hematol. Blood Transf., Moscow, USSR), Iu. A. Sharova and N. A. Dubrovina. *Ter. Arkh.* 40(2): 27-30, 1968.

A detailed study of blood coagulation in 93 patients (73 men and 20 women, 20-84 yr old) with peptic ulcer disease (20 gastric and 73 duodenal) of from a few months to 21 yr duration, 14% of whom had occult blood in the feces, revealed significant abnormalities in most cases. Thus, the prothrombin index was decreased to an average of 95% (71-94% in 46 cases) and the proconvertin was decreased to an average of 89% (47-80% in 26 cases). The heparin concentration was above normal in 49 of 84 patients studied, averaging 10.6 U/ml, many also showed reduced platelet counts. The blood fibrinogen level ranged from 111 to 444 mg%, and 27 patients showed hypofibrinogenemia; 33% of the patients showed increased fibrinolytic activity (decrease in fibrinolysis time to 54-66 min), but in 26 cases the time was increased, up to a maximum of 6 hr 42 min. In contrast, Factor VIII levels were above normal in 21 of 55 cases, reaching 222-320%, the recalcification time was decreased to an average of 2 min 12 sec, the coagulation time was decreased in 30 patients, and the tolerance to heparin was increased in 27. The last two shifts are considered to be the result of attempted compensation for the abnormalities in blood proteins. There was no clear parallel between the fibrinolytic activity and the glucocorticoid activity of the adrenals.

1298 VAGOTOMY ASSOCIATED WITH ANTRAL DRAINAGE IN THE TREATMENT OF GASTRIC ULCER. *(Sp.)* De Miguel, J. (Valladolid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 27(1):24-48, 1968.

Radiological and clinical follow-up revealed uniformly favorable results in 13 patients treated by vagotomy plus antral drainage for gastric ulcers in the period 1961-65 (10 of 13 treated in 1965). One of the 13 had a pyloric ulcer and 6 of the 12 others also had duodenal ulcers. The most common technique (11 cases) was selective bilateral vagotomy plus pyloroplasty, but two cases received total vagotomy plus gastroenterostomy. Gastric ulcers had disappeared radiologically in all cases by February of 1967 (in one case the ulcer had disappeared in 15 days), and the clinical results were considered excellent in 12 cases (although 2 of the 12 had a mild dumping syndrome); one patient complained of persistent gastritis in the absence of a visible ulcer. Intestinal function was normal in 10 of 13 cases. On the basis of these results, the results in the surgical literature, and a review of the role of pyloric stenosis, gastric stasis, gastrin and hypersecretion in the pathogenesis of gastric ulcers, it is concluded that vagotomy plus drainage should replace partial gastrectomy in the treatment of this condition.

1299 JUSTIFICATION AND VALUE OF TEMPORARY GASTROSTOMY AS A COMPLEMENT TO VAGOTOMY AND PYLOROPLASTY IN THE TREATMENT OF DUODENAL ULCER. *(Fr.)* Lagrot, F. (Surg. Clin., Toulouse, France), P. Coriat, J. Greco, P. Micheau and M. Costagliola. *Chir. Gastroent.* 2(1):3-5, 1968.

Careful follow-up studies in approximately 500 cases of duodenal ulcer treated over a 20-yr period have shown that vagotomy and pyloroplasty, plus local excision of the ulcer when practicable, are the surgical treatment of choice for this disease. Pyloroplasty is to be preferred to gastrojejunostomy, gastrectomy or antroduodenostomy, which can often aggravate the condition. However, bilateral vagotomy necessitates postoperative aspiration of the stomach contents to control hypersecretion. Rather than the usual nasal catheter, which is disagreeable for the patient, often promotes gastric hypersecretion, and can lead to loss of water and electrolytes, rhinopharyngitis, tracheitis, parotitis and pharyngoesophageal ulceration, a temporary gastrostomy is recommended. A Pezzer catheter is introduced into the stomach through a small puncture wound in the anterior wall of the antrum, 8 cm from the pylorus, and the stomach is sutured to the anterior abdominal wall. The catheter emerges near the umbilicus and can be withdrawn in 4-7 days, after which the gastrostomy heals spontaneously. The use of a second, jejunal catheter is no longer recommended. There was only one fatality (not ascribable to the gastrostomy) among about 120 cases treated by this method.

1300 STUDIES ON THE PROTECTIVE ACTIVITY OF THE β-DIMETHYLAMINOETHYL ESTER OF α,α-DIPHENYL-α-PROPARGOXYACETIC ACID AGAINST THE GASTRIC ULCERS PRODUCED BY PYLORIC LIGATION, 5-HYDROXYTRYPTAMINE AND RESTRAINT IN THE RAT.

(It.) Torrielli, M. V. (Inst. Pharmacol., U. Perugia, Italy). *Ann. Med. Perugia* 58(3):529-537, 1967.

In experiments carried out on a total of 120 adult male Wistar rats, s.c. injections of the β-dimethylaminoethyl ester of α,α-diphenyl-α-propargoxyacetic acid were found to exert a significant protective effect against ulcers produced by ligation of the pylorus (Shay ulcer), restraint, or s.c. injections of serotonin (20 mg/kg as the double sulfate of serotonin and creatinine, twice in 17 hr). The drug was administered in saline either as a single dose of 3.75-30.0 mg/kg, 30 min before pyloric ligation or 1 hr before onset of restraint or the first injection of serotonin, or as two injections totaling 5.625-45.0 mg/kg, 30 min before and 6 hr after pyloric ligation, 1 hr before and 16 hr after the onset of restraint, or 1 hr before each of the injections of serotonin. The animals were sacrificed either 17 hr after pyloric ligation, 29 hr after the onset of restraint, or 8 hr after the second injection of serotonin. Examination of the stomachs showed that optimal doses of the drug (not usually the highest doses) decreased the number of ulcers per animal from an average of 22.5-28.2 to 6.8 in Group I (Shay ulcer), from 9.1-13.25 to 3.0 in Group II (serotonin ulcer), and from 5.9-6.0 to 2.4 in Group III (restraint ulcer). The Placer index was reduced from 80.2-81.4 to 25.8 in Group I, from 32.8-40.3 to 14.5 in Group II, and from 23.6-24.1 to 9.87 in Group III. Finally, the percentage of animals free of ulcer at the end of the experiment was increased from 10% to 50% in Group I, from 0% to 50% in Group II, and from 10% to 30% in Group III. The two-injection regimen was generally more effective than the single injections.

1301 STEROID ULCERS: THEIR PATHOGENESIS, INCIDENCE, LOCALIZATION AND SEX DISTRIBUTION.

(Ger.) Lie, T. S. (Surg. Clin., U. Bonn-Venusberg, Germany). *Zbl. Chir.* 93(8):306-317, 1968.

A compilation of data reported in 29 publications appearing between 1950 and 1960 revealed an ulcer incidence (new peptic ulcer or reactivation of an old ulcer) of 0.5-31% (average 6%) among 6020 patients treated with ACTH, cortisone, prednisone and/or prednisolone for rheumatoid arthritis, ulcerative colitis or other diseases. There was a definite relationship between the incidence of ulcers and the duration of steroid therapy. The ratio of gastric to duodenal ulcers among these patients was about 3:4 (121:157), compared to a ratio of 1:5 for idiopathic peptic ulcer, indicating that steroids exert their effect mainly on the stomach. The sex ratio was about 1:1, which also contrasts with the predominance of males in cases of idiopathic peptic ulcer. The pathogenesis of glucocorticoid-induced ulceration is discussed on the basis of a detailed review of the literature (140 refs.), and it is concluded that hypersecretion of HCl and pepsin, the decreased resistance of the gastric mucosa, and the inhibitory effect of steroids on wound healing all play a role.

1302 THE TREATMENT OF PERFORATED ULCERS OF THE DUODENAL BULB: A REPORT OF 207 CASES.

(Fr.) Combemale, B. (Munic. Hosp., Lille, France), M. Vankemmel, F. Leplat and G. Lagache. *Lille Chir.* 22(6):271-280, 1967.

Among 207 patients (201 men and 6 women, most 30-60 yr old) treated for perforated duodenal ulcer in the period 1950-65, 42% had a history of peptic ulcer disease lasting for from a few weeks to 30 yr, and 35% were admitted more than 6 hr after perforation. Nevertheless, there were only 18 early deaths, 146 patients could be treated successfully by suture or continuous aspiration (Taylor method), and at least 36 cases were cured by these conservative procedures. Among 69 patients initially treated by suture, 11 died; one patient was successfully treated by vagotomy plus pyloroplasty, and 44 were gastrectomized (4 of whom died). Among 93 treated initially by aspiration, the procedure was successful in 68 cases, while 1 died and 24 were treated in other ways (2 by gastrectomy and 22 by suture, resulting in 2 more deaths and 20 more successful sutures). Conservative procedures thus led to 14 deaths (8.7%) and gastrectomy led to 4 deaths (8.7%). Although the mortality rate for suture alone was 14.2%, it should be noted that 9 of these 13 patients had been admitted more than 12 hr after perforation, a that in the earlier years suture was done only in cases in which gastrectomy was contraindicated. Among the 146 cases treated successfully by conservative procedures, 35 were lost to follow-up; 12 died (at least 8 of causes unrelated to the ulcer); 38 (27%) required eventual surgery (including 20 cases treated by suture and 18 treated by aspiration, although 9 of the patients treated by aspiration were among the 12 who required relatively early surgery); 25 (17.1%) required medical treatment; and 36 (24.6%) were cured (24 after aspiration and 12 after suture). Among the 61 who were cured or maintained on medical treatment, 25 had been followed for more than 4 yr and 31 for 2-4 yr. It is noteworthy that cures were obtained in 67% of those without a history of peptic ulcer, 52% with a recent history, and only 18% of those with a long history of ulcer disease. On the basis of their experience, especially that of the last decade, the authors conclude that gastrectomy is contraindicated as an emergency procedure for perforated duodenal ulcer. The Taylor aspiration method is highly recommended, but only if the diagnosis is certain (aspiration is not advised for gastric ulcer), if the patient has not recently eaten, and if the perforation occurred no more than 6 hr before. If these conditions are not met or if aspiration is unsuccessful after a 4-hr trial, then suture or an operation such as vagotomy and pyloroplasty is recommended.

1303 EFFECT OF VAGOTOMY ON THE PRODUCTION AND CURE OF EXPERIMENTAL ULCERS

(It.) Vecchioni, R. (Inst. Gen. Clin. Surg., U. Padua, Italy), G. Perrino and C. Cordiano. *Acta Chir. Ital.* 23(5):557-563, 1967.

Groups of 20 adult, male, albino rats, either intact or immediately to 60 days after subdiaphragmatic bilateral truncal vagotomy, were subjected to ligation of the pylorus by the Shay method and were sacrificed 16 hr later. Whereas intact rats developed large numbers of gastric ulcers following pyloric ligation, localized mainly in the rumen (70%), vagotomized rats developed significantly fewer ulcers, and the preferred site was the antrum. The ulcer index (ratio of stomach surface to number of ulcers) was 0.531 in intact rats, 3.02-3.04 in rats vagotomized immediately or 3 days before pyloric ligation, 8.00 in rats vagotomized 15 days before pyloric ligation, and 1.08-1.06 in rats vagotomized 30-60 days before pyloric ligation, indicating that the protective effect of vagotomy is greatest after about two weeks. In rats in which the ligature was removed from the pylorus after 16 hr, the gastric lesions gradually healed, as shown by an ulcer index which increased to 2.31 in 8 days, 4.04 in 20 days, and 6.63 in 40 days. Vagotomy at the time the ligature was removed (a procedure attended by a mortality rate of 40%) accelerated the healing process, resulting in an ulcer index of 9.21 in these rats after 20 days, along with signs of hypertrophic gastritis.

1304 OUR EXPERIENCE WITH THE SURGICAL TREATMENT OF DUODENAL ULCER. *(Fr.)*

Fontaine, R. (Surg. Clin. A, Strasbourg, France), S. Babin, B. L'Huillier, M. Lempert and P. Louis. *Gaz. Hop.* 140(6):159-160, 1968.

Among 706 patients subjected to surgery for duodenal ulcer in the period 1945-67, 14 had a Péan gastrectomy, 648 had a Polya gastrectomy, and 44 were treated by vagotomy plus either gastroenterostomy (28 cases), pyloroplasty (6 cases), or antrectomy (10 cases). The overall mortality was 6.4%, the 45 deaths being attributed to rupture of the suture (15 cases), local hemorrhage (7 cases), bronchopneumonia (7 cases), pulmonary embolism (5 cases), hernia (2 cases), or various other causes. Two of the deaths (both in cirrhotics) were among the patients treated by vagotomy plus pyloroplasty, while the other 43 were among the cases of Polya gastrectomy. These included 29 deaths among 565 cases of simple gastrectomy for uncomplicated duodenal ulcer and 14 deaths among 83 cases treated on an emergency basis for hemorrhage. A total of 352 cases was followed for at least several years postoperatively, half of these for 10-21 yr; among these cases, there were only 3 recurrences, all after gastrectomy. The overall results were good in 268 cases (13 of 26 vagotomies, 5 of 7 Péan gastrectomies and 250 of 319 Polya gastrectomies), intermediate in 67 cases (12 of 26 vagotomies, 2 of 7 Péan gastrectomies, and 53 of 319 Polya gastrectomies), and poor in 17 cases (1 vagotomy and 16 Polya gastrectomies). It is concluded that gastrectomy is a useful procedure for duodenal ulcer.

1305 GASTRIC SECRETION FOLLOWING SURGERY FOR DUODENAL ULCER. *(Sp.)*

Ribera, M. T. (Santa Cruz y San Pablo Hosp., Barcelona, Spain), L. Gramática, M. Martínez-Brey and R. Hortas. *Cir. Ginec. Urol.* 21(6):540-542, 1967.

Gastric secretion was studied by means of the standard histamine test and the insulin test in 55 patients who had been treated by vagotomy plus a variety of other procedures for peptic ulcer; all patients had a history of preoperative hyperchlorhydria. Among 40 patients who were subjected to vagotomy plus antrectomy and tested 12-13 days postoperatively, 34 of 36 showed a normal response to histamine, and 37 of 40 had a negative insulin test. A normal response to histamine was also obtained in 3 of 5 treated by gastroenterostomy plus vagotomy (negative insulin test in 3 of 4 tested), but in none of 5 patients given pyloroplasty plus vagotomy (despite a negative insulin test in all 5). All 4 patients tested more than one year after antrectomy plus vagotomy showed normal responses to histamine and negative insulin tests. One patient treated by pyloroplasty plus selective vagotomy, however, showed persistent hyperchlorhydria in response to both histamine and insulin. On the basis of the insulin test, vagotomy was thus complete in 49 of 53 possible cases, while persistent hyperchlorhydria in response to histamine was found in 10 of 51 cases tested (6 of 10 following pyloroplasty). It should be noted, however, that even in these cases the acid secretion was below the preoperative levels.

1306 A DEFINITIVE TREATMENT FOR PERFORATED DUODENAL ULCERS. *(Sp.)*

De La Cruz Caro, F. (Fac. Med., U. Cadiz, Spain), F. Higuero Moreno and M. Pardo Martínez. *Cir. Ginec. Urol.* 21(6):509-512, 1967.

A technique for the surgical treatment of perforated peptic ulcer is proposed, which represents a compromise between an emergency gastrectomy, with its inherent risk for the seriously ill patient, and temporary suture of the perforation, with the necessity of reintervention at a later date. Based on experience with 27 cases (males, 16-62 yr old), the authors recommend total truncal vagotomy plus either pyloroplasty, extending the orifice of the perforation upwards and downwards, or rhomboidal resection of the ulcer followed by pyloroplasty and extramucosal suture. In either case, the peritoneal cavity is also carefully cleaned out and treated with terramycin. Among the authors' cases, 11 were treated by simple pyloroplasty and 16 by resection of the ulcer. Follow-up for periods of 6-39 months revealed good results in all but one case, a 62-yr-old man with persistent symptoms, who required subsequent gastrectomy. The only complications were immediate postoperative diarrhea in 4 cases, lasting 4-20 days, 2 cases of phlebitis, one case of recurrent diarrhea, and one hernia 3 months postoperatively. The method is recommended for duodenal and juxtapyloric gastric ulcers which have perforated no more than 12-18 hr before in patients up to the age of 40-55 yr.

1307 THE PROBLEM OF THE TREATMENT OF POSTBULBAR ULCERS. *(Rus.)*

Mamamtavrishvili, D. G. (Tiflis Inst. Postgrad. Med., USSR). *Klin. Khir.* (2):31-35, 1968.

Among the 500 duodenal ulcer patients treated at the author's clinic in recent years 45 (41 males and 4 females, average age 42 yr) had a postbulbar ulcer. Only 18 of these patients had severe pain, and the pain was not characteristic of an ulcer, being localized to the epigastrium or upper right quadrant with irradiation to the spine or right shoulder. Bleeding (hematemesis and/or melena) was noted in 30 cases, and 2 of 10 with severe hemorrhage died before surgery could be begun. Among the 28 who were operated, 8 were bleeding severely at the time of operation and 3 of these 8 died. Perforation is rare in this type of ulcer and was seen in only one case; another case had obstructive jaundice. Penetration, on the other hand, is a common complication, and was seen in 36 of the 45 cases, combined in 20 cases with bleeding, in 8 with stenosis, in 4 with mechanical jaundice, and in 2 with internal biliointestinal fistulas; the other 9 patients had pseudodiverticula. Among the 43 who came to surgery, 2 of 30 with apical ulcers and 1 of 13 with juxtapapillary ulcers died (2 of acute blood-loss and 1 of pulmonary embolism). Operations performed included resection of part of the duodenum and two-thirds of the stomach (12 cases), lateral duodenotomy and gastric resection (8 cases), antrectomy + vagotomy (8 cases, plus a biliointestinal anastomosis in 3 of 8), Finney's operation (12 cases), and the Finsterer operation (3 cases). Most were discharged in good condition. A follow-up of more than 3 yr was possible in 21 cases (none of whom had received vagotomy), and all were well. On the basis of short-term results, vagotomy also seems to be a helpful procedure. On the basis of the findings in these 45 cases, it is concluded that postbulbar ulcers generally have a severe course, due mostly to their retroperitoneal location (usually on the posterior wall of the descending segment of the duodenum) and to the development of serious complications (hemorrhage, stenosis, penetration into the head of the pancreas). Because of the small diameter of the ulcer crater, these ulcers are often overlooked, not only by the radiologist but even by the surgeon. Diagnostic duodenotomy is strongly recommended in suspect cases, especially in the presence of regional lymphadenitis and edema of the retroperitoneal space in the area of the descending duodenum. It is also recommended that radical surgery (resection of the duodenum plus two-thirds of the stomach, plus vagotomy) be more widely used for juxtapapillary ulcer, since the Finsterer operation has not lived up to initial expectations.

1308 THE STUDY OF GASTRIC SECRETION IN DUODENAL ULCER.

(Fr.) Pissidis, A. G. (Surg. Clin., U. Leeds, England), G. R. Giles and C. G. Clark. *Lyon Chir.* 64(1):13-21, 1968.

In an attempt to evaluate the tests which are currently in use for the study of gastric secretion, particularly those based on stimulation by histamine, meat extract, and insulin, determinations were made under various conditions in several normal subjects and in patients with duodenal ulcer. In both normals and ulcer patients, gastric secretion is higher in males than in females. In the maximal histamine test (perfusion with 0.04 mg/kg/hr i.v.), the average for both sexes was about 20 mEq/hr in normals and 35 mEq/hr in ulcer patients, but 5 of 41 ulcer patients had levels below the normal average and 13 of them had levels in the normal range. The maximal histamine test is thus of limited diagnostic value. The insulin test (secretory response to 0.15 U/kg i.v.) is of value only in verifying the completeness of vagotomy. The role of the gastric antrum can be studied by administration of 100 ml of meat extract via gastric catheter. Most normal subjects show increased gastric secretion under these conditions, and the response is somewhat greater in ulcer patients. Again, however, the test is of limited diagnostic significance, especially since there is a definite correlation between antral response and maximal secretory capacity. It is concluded that the effect of gastrin depends both on the number of parietal cells and the basal vagal activity. The effect of vagotomy should ideally be evaluated on the basis of all three types of secretion: spontaneous, histamine-induced, and gastrin-induced. Histamine-induced secretion is reduced by an average of 60% after vagotomy, but the effect varies greatly; antral secretion is also usually reduced, sometimes proportionally and sometimes to the extent of being totally abolished, but in other cases the effect is minimal. Among 22 patients with a recurrent ulcer following vagotomy and drainage, the insulin test showed that 19 had an incomplete vagotomy, although some of these had very low gastric acidity; in 2 of the 3 cases in which the vagotomy was complete, there was an almost equal response to histamine and meat extract. The spontaneous secretion in these 22 patients amounted to 5.6 mEq/hr, and the histamine-induced secretion to 24.2 mEq/hr. Although the secretory response varies markedly in patients with recurrent ulcer, it is felt that incomplete vagotomy is still the principal cause.

1309 GASTRIC ACID SECRETION AND SUCCINIC DEHYDROGENASE IN PARIETAL CELLS.

(E.) Gravgaard, E. (Cent. Hosp., Randers, Denmark). *Scand. J. Gastroent.* 3(1):1-6, 1968.

Augmented histamine tests and gastric biopsies were performed and parietal cell succinic dehydrogenase activity was determined in 5 healthy subjects and 45 patients with various gastroduodenal disorders. In addition, 26 duodenal ulcer patients and hypersecretion dyspepsia patients without demonstrable ulcers were either surgically treated or given glycopyrrolate (0.5 and 1.0 mg). Gastric acid secretion was directly related to the size and number of succinic dehydrogenase-active parietal cells; the correlation between hourly hydrogen ion output and parietal cell layer thickness was confirmed. Significant decreases in acid output, number and size of succinic dehydrogenase-active parietal cells, and the thickness of the parietal cell layer were noted after glycopyrrolate administration. The inhibition of gastric acid secretion following glycopyrrolate is correlated with the decrease in succinic dehydrogenase-active parietal cell mass per U of gastric mucosa.

1310 COMPARATIVE EFFECTS OF TETRAGASTRIN AND HISTAMINE ON ACID AND INTRINSIC FACTOR SECRETION IN MAN.

(E.) Koster, K. H. (Bispebjerg Hosp., Copenhagen, Denmark), P. Rodbro and H. J. Petersen. *Scand. J. Gastroent.* 3(1):23-35, 1968.

The effects of subcutaneous injections of histamine (40 μg/kg) and tetragastrin (2.5 μg/kg) on secretory volume and stomach acid and intrinsic factor secretion were compared in 52 gastric or duodenal ulcer patients. The correlation between secretory volume, maximum acidity, and acid output after tetragastrin and histamine stimulation is highly significant. Secretory responses to 5-10 μg/kg of tetragastrin and 40 μg/kg of histamine were similar; doubling the tetragastrin dosage failed to increase stomach acid secretion. Comparison of intrinsic factor secretions following injection of tetragastrin or histamine revealed similar secretory patterns. No side effects were noted after tetragastrin administration.

1311 NONSPECIFIC ULCER OF THE SMALL INTESTINE.

(E.) Shamblin, J. R. (Druid City Hosp., Tuscaloosa, Ala.). *Southern Med. J.* 61(4):370-374, 196

Perforated ileal ulcers were found during surgery in 2 male patients admitted to hospital with severe abdominal pain. Preoperative diagnosis of nonspecific ulcers is rare; the condition should be suspected in patients with atypical periumbilical pain and negative gastrointestinal X-ray series. Tryptic or peptic digestion, trauma, localized ischemia, tuberculosis, uremia, syphilis, infection, foreign bodies, stricture, sympathetic nervous system disease, and enteric-coated KCl, usually with thiazide diuretics, have previously been proposed as etiological factors; both patients had been treated with diuretics before admission. Intestinal resection was performed in both patients, who remained asymptomatic after surgery.

1312 **PERFORATED PEPTIC ULCER.** *(E.)* Burdette, W. J. (U. Texas, M. D. Anderson Hosp., Houston) and B. Rasmussen. *Surgery* 63(4):576-585, 1968.

In 103 patients treated for peptic ulcer perforation, over a 10-yr period, surgical treatment or continuous aspiration resulted in a 24% mortality rate; simple suturing resulted in 16% mortality. Advanced age, elapsed time between perforation and treatment, severe associated diseases, and incorrect diagnosis account for increased morbidity and death; large perforations in large chronic ulcers, gastric ulcers, coexistent hemorrhage, and multiple ulcers also lead to increased morbidity and death. Immediate surgery whenever possible and routine definitive surgical repair shortly thereafter (when simple plication has been used) are recommended in the management of peptic ulcer perforation.

1313 **ANTICHOLINERGIC REDUCTION OF PROLONGED 'MAXIMAL' HISTALOG-STIMULATED GASTRIC SECRETION IN MAN.** *(E.)* Broome, A. (Cent. Hosp., Boras, Sweden) and S. O. Isacsson. *Scand. J. Clin. Lab. Invest.* 20(4):347-352, 1967.

Studies in 11 male patients with proved hypersecretion and duodenal ulcers demonstrated that gastric acid secretion can be maintained at consistent high levels for up to 11 hr by repeated doses of Histalog (100 mg s.c. followed by 50 mg hourly to a total of 550 mg in 11 hr). This high rate of acid production is accompanied by increases in serum bicarbonate and decreases in serum potassium, but no significant change in serum sodium levels; acid production itself is not significantly affected by electrolyte replacement therapy. The high level of gastric secretion under the influence of Histalog was then used to facilitate the study of the duration of action of an anticholinergic drug (Daricol; oxyphenycyclimine HCl; 10 or 20 mg p.o.) administered one hour before the start of the Histalog stimulation; the 10 mg dose was found to decrease acid production by a maximum of about 40% in 3-5 hr and continued to depress acid production significantly for at least 6 hr, while the 20 mg dose decreased acid production by a maximum of about 45% in 2-7 hr and continued to depress acid production significantly for at least 11 hr. Basal secretion was depressed significantly only by the larger dose. The only side effects ascribable to the anticholinergic were dry mouth and transient nausea. Oxyphencyclimine is recommended for further trial in the treatment of peptic ulcer, especially in view of its long duration of action, and prolonged stimulation of secretion with Histalog is recommended as a technique for the evaluation of antisecretory agents.

1314 **INHIBITION OF CORTISOL PRODUCTION: ITS EFFECT ON GASTRIC SECRETION AND ULCER PROVOCATION.** *(E.)* Nicoloff, D. M. (VA Hosp., Minneapolis, Minn.) and D. Van Nostrand. *J. Surg. Res.* 8(5):214-219, 1968.

Transplantation of the gastric antrum onto the colon as an antiperistaltic diverticulum, followed by gastrojejunostomy, led to the development of gastrojejunal ulcers in 8 of 10 control dogs and only 1 of 11 dogs treated with Metopirone (100 mg/kg/day p.o. until death or sacrifice); the ulcer in the treated dog and 4 of the 8 ulcers in control dogs were perforated. In groups of 5 and 6 dogs, the same dose of Metopirone decreased the acid secretion from vagally denervated gastric pouches in response to either a standard meal or histamine (1.0 mg s.c.) by 75% and 51%, resp.; the volume of secretion in these groups was decreased by 37% and 42%, resp. Further studies in 3 additional dogs given 25, 50, 75, or 100 mg/kg/day of Metopirone for periods of 20 days revealed a dose-response relationship between the dose of Metopirone and the depression of acid secretion. These results indicate that the protective effect of Metopirone against gastrojejunal ulceration is probably due to a decrease in acid secretion, although the mechanism of this effect remains unknown. In 5 other dogs, fundal biopsies before and after administration of Metopirone (100 mg/kg/day p.o.) for 3 weeks revealed no decrease in parietal cell population or mucosal thickness. There were also no significant changes in serum electrolytes, liver function, or adrenal and thyroid weight.

1315 **CALCIUM METABOLISM IN PEPTIC ULCER OF THE JEJUNUM.** *(Pol.)* Sokolnicki, J. (2nd Surg. Clin., Acad. Med., Poznan, Poland) and R. Kwiatek. *Pol. Tyg. Lek.* 23(20):749-751, 1968.

Biochemical studies were carried out on two groups of patients with recurrent peptic ulcers of the jejunum following surgery for gastric or duodenal ulcer: 10 patients (19-56 yr old) who had been operated on once, 2-4 yr before, and 10 patients (37-65 yr old) whose second successful operation had taken place 4-10 yr before. Hypercalcemia was detected in 8 of 10 and 9 of 10, resp., hyperphosphatemia in 7 of 10 and 3 of 10, hyperphosphaturia in 5 of 10 and 8 of 10, and hypercalciuria in 1 of 10 and 7 of 10. Serum proteins were similar in the two groups, averaging 6.6 g% with a tendency toward decreased albumin and increased globulin. Anemia was present in 9 of 10 and 7 of 10, resp., and 7 of the first group showed an ulcer niche on X-ray. While the patients in the second group produced essentially no free gastric acid, basal acid secretion was elevated in 3 of 10 and subnormal in 4 of 10 of the first group, and stimulated gastric secretion was greater than normal in 5 of 10 of this group. The results suggest that disturbances in calcium metabolism develop relatively early in the course of peptic ulcer disease. Possible causes include malabsorption due to changes in anatomical relations and poor nutrition due to changed dietary habits. The possible effect of gastric acidity on the development of these disturbances remains unclear.

1316 **GASTRIC ACIDITY AND MOTILITY.** *(E.)* George, J. D. (Roy. Victoria Hosp., Belfast, U.K.). *Amer. J. Dig. Dis.* 13(4):376-383, 1968.

The rate of emptying of a fluid test-meal and the amount of acid secreted by the stomach in response to this meal were measured simultaneously by the phenol red method in 27 normal subjects, 34 patients with duodenal ulcer and 48 patients with gastric ulcer; in 45 patients, the maximal acid secretion in response to Pentagastrin (6 μg/kg s.c.) was also measured. The mean gastric emptying time (time required for the volume to decrease to 10 ml) was 107 min (40-253 min) in gastric ulcer patients compared to 70.1 min (49-98 min) in normal controls and 73.1 (36-128) in patients with duodenal ulcer. There was no significant difference in the starting indices, so that the delayed emptying of gastric ulcer patients was due to a continuing effect. The amount of acid secreted in 30 min in response to the test-meal, however, was significantly greater in duodenal ulcer patients (15.2 mEq) than in gastric ulcer patients (7.1 mEq) or controls (6.2 mEq). The suggestion is made that the emptying rate be considered together with the gastric acid secretion, since patients with a normal parietal cell mass, as indicated by a normal response to maximal stimulation, may pass a more acidic fluid into their duodenum than normal subjects if they empty more rapidly, while in gastric ulcer patients the normal amount of acid may be in contact with the gastric mucosa for a much longer time than in normals. Calculation of the "concentration contact-time index" yielded a value of 45, for example, for normal controls and 93 for selected gastric ulcer patients whose secretory response to Pentagastrin had been shown to be within normal limits. After 90 min, many gastric ulcer patients still had a considerable amount of acid in their stomachs, while most normal subjects had very little remaining 1 hr after the test-meal. The possible etiologic role of abnormalities in gastric emptying is discussed in relation to both gastric and duodenal ulcers.

1317 CLINICAL DATA AND CHARACTERISTICS DIFFERENTIATING TYPES OF PEPTIC ULCER.

(E.) Veselý, K. T. (Inst. Human Nutr., Prague, Czechoslovakia), Z. Kubičková, M. Dvořáková and K. Zvolánková. *Gut* 9(1):57-68, 1968.

Ulcer incidence, age of onset of symptoms, smoking habits, frequency of appendectomy, family history, acid secretory status, and the association with various blood groups, the presence of ABH blood group factors in the saliva and the ability to taste phenylthiocarbamide were investigated in 1160 ulcer patients (860 men and 300 women, 10-80 yr old) and a similar number of controls. Based on previous findings, ulcers are classified as duodenal (752 cases with a sex ratio of 3.16), primary gastric (240 cases with a sex ratio of 2.16), and combined (168 cases with a sex ratio of 2.82). All of the cases of combined ulcer were patients admitted for gastric ulcer who had a history of duodenal ulcer an average of 11 yr before; such gastric ulcers appeared in 18% of all patients with duodenal ulcer, and accounted for 41% of all cases of gastric ulcer. They were less likely than primary gastric ulcers (173 above the angulus and 67 below) to be located above the angulus (94 cases compared to 74 below the angulus), and their age at onset of symptoms was the oldest of any of the types (47.92 yr compared to 33.4-36.84 yr for duodenal ulcers and 44.58 yr for primary gastric ulcers). Gastric ulcers which developed below the angulus tended to appear earlier in life than those above the angulus, confirming the hypothesis that the propensity of the mucosa to develop an ulcer spreads from the duodenum upwards with increasing age. Close relatives with a history of peptic ulcer were found in 22.1-25.9% of all three groups, compared to 8% of controls. Among patients with duodenal ulcer, 63% showed gastric hyperacidity, while among patients with gastric or combined ulcers most showed hypoacidity (although hyperacidity was slightly more common among patients with gastric ulcers below the angulus). The tendency toward hyperacidity was particularly marked in duodenal ulcer patients of blood group O. Duodenal and combined ulcer patients generally showed a higher frequency of blood groups O and AB, while in gastric ulcer patients the blood group distribution was the same as in controls. The percentage of nonsecretors of ABH blood group substances was 36% in duodenal ulcer patients compared to 26.5% in patients with gastric ulcer and 25% in controls. Phenylthiocarbamide taste sensitivity was somewhat more common among ulcer patients than among controls, with little difference between the types of ulcer. There was also little difference between the types of ulcer with regard to the clinical symptoms. Smoking was somewhat more common among ulcer patients (74% of the men and 28-38% of the women) than among controls (58.2% of the men and 25.7% of the women). A history of appendectomy, on the other hand, was recorded in 19% of controls, 20% of patients with duodenal ulcer, 11% of patients with combined ulcer and only 7% of patients with primary gastric ulcer. It is concluded that peptic ulcer is a benign, nonspecific lesion of the mucous membrane and walls of those sections of the digestive tract that are exposed to the peptic action of the gastric juices. It is caused by a disturbance of the normal balance between the aggressive and protective processes in the digestive tract.

1318 SOME EXPERIENCE WITH DEGLYCYRRHIZINATED LIQUORICE IN THE TREATMENT OF GASTRIC AND DUODENAL ULCERS WITH SPECIAL REFERENCE TO ITS SPASMOLYTIC EFFECT.

(E.) Tewari, S. N. (Wakefield Grp. Hosp., Yorkshire, England) and F. C. Trembalowicz. *Gut* 9(1):48-51, 1968.

In a double-blind cross-over study on 54 ambulatory patients (30 men and 24 women, 12-90 yr old) with duodenal (48) or gastric (6) ulcers of 4 months to 20 yr duration, treatment with liquorice (tablets containing 380 mg deglycyrrhizinated liquorice, 100 mg bismuth subnitrate, 100 mg aluminum hydroxide gel, 200 mg magnesii carbonas levis, 100 mg $NaHCO_3$ and 30 mg powdered frangula bark; 2 tablets chewed 3 times daily after meals, for 4 weeks) in combination with Alcin (sodium magnesium aluminum silicate and basic magnesium aluminate) lozenges when needed produced "good" results in 22 of 28 compared to 1 of 26 given a placebo (3 of 28 and 7 of 26 "improved"). Radiology showed complete disappearance of the gastric lesion during treatment in 5 of 6 patients and a decrease in size from 60 to 20 mm^2 in 1 of 6, with no change in size during placebo treatment. Among 15 duodenal ulcer patients included in the cross-over study, 10 showed improvement only on the drug, 2 showed improvement on both drug and placebo, 2 showed no improvement on either regimen, and one improved on placebo only. The average number of Alcin tablets required per week decreased from 6.1 on placebo to 2.6 while on the drug. Side effects included slight diarrhea in 2 cases, headache or dizziness in 2, and weight gain in 2. Additional radiological studies revealed relaxation of spasticity and better filling of the duodenal cap in all 20 duodenal ulcer patients given the drug but in none of the 30 patients given either no treatment or a proprietary antacid. The drug produced no effective relaxation of pylorospasm in patients without duodenal ulceration.

1319 **TREATMENT OF GASTRIC ULCER WITH OESTROGENS.** *(E.)* Doll, R. (Cent. Middlesex Hosp., London, England), M. J. S. Langman and H. H. Shawdon. *Gut* 9(1):46-47, 1968.

A double-blind study of the effect of diethylstilbestrol (0.5 mg twice a day for 4 weeks) on the healing of gastric ulcers in 32 male patients revealed no significant benefit from the use of the drug. These patients were also receiving carbenoxolone sodium (150-300 mg/day) combined with two different diuretic regimens. The ulcer healed completely in 4 of 16 on estrogen and 8 of 16 on placebo, and the average decrease in size of the ulcer niche was 64.3% of the initial size (114.3% of the mean size) on estrogen and 55.2% (120.4%) on placebo. It should be noted, however, that 7 of the 16 patients on estrogen and only 1 of the 16 on placebo had ulcers which were initially 100 mm^2 or larger.

1320 **TREATMENT OF GASTRIC ULCER WITH CARBENOXOLONE: ANTAGONISTIC EFFECT OF SPIRONOLACTONE.** *(E.)* Doll, R. (Cent. Middlesex Hosp., London, England), M. J. S. Langman and H. H. Shawdon. *Gut* 9(1):42-45, 1968.

Carbenoxolone sodium (50-100 mg 3 times a day for 4 weeks) was used in the ambulatory treatment of chronic gastric ulcer in 56 outpatients (32 men and 24 women) who also received either spironolactone (25 mg 4 times daily for 4 weeks) or hydrochlorothiazide (50 mg/day when needed because of edema, hypertension or weight gain, supplemented by potassium), as well as antacids *ad libitum.* Radiological healing was observed in 12 of 36 given 100 mg of carbenoxolone sodium (75 mg if over 65 yr old) and in 5 of 22 given 50 mg of carbenoxolone sodium; these 17 healed patients included 13 of 28 given hydrochlorothiazide and 4 of 28 given spironolactone. The average decrease in size of the ulcer niche was 88.6-90.8% in patients given large doses of carbenoxolone plus hydrochlorothiazide, 50.4% in those given low doses plus hydrochlorothiazide, 47% in those given high doses of carbenoxolone sodium plus spironolactone, and 28% in those given low doses plus spironolactone. However, only 1 of 28 given spironolactone showed any evidence of fluid retention, compared to 15 of 28 given hydrochlorothiazide, and the mean maximum increases in systolic pressure were 16 mm Hg in those given high doses of carbenoxolone plus hydrochlorothiazide, 18 mm Hg on low doses of carbenoxolone plus hydrochlorothiazide, 13 mm Hg on high doses of carbenoxolone plus spironolactone, and 7 mm Hg on low doses of carbenoxolone plus spironolactone. It seems that spironolactone effectively blocks both the side effects and the healing properties of carbenoxolone sodium. Treatment with a thiazide diuretic does not interfere with ulcer healing, which is significantly more consistent with the high dose than with the low dose of carbenoxolone sodium.

1321 **THE MANAGEMENT OF PERFORATED PEPTIC ULCER.** *(E.)* McKenna, K. P. (Roy. Adelaide Hosp., Australia). *Aust. New Zeal. J. Surg.* 37(3):297-301, 1968.

A review of the case histories of 211 patients (193 males and 18 females, 10->80 yr old) treated for perforated peptic ulcer by simple suture in the period 1949-54 (follow-up of 10-15 yr) revealed that 147 of the ulcers were duodenal, 34 were pyloroduodenal and 31 were gastric; the operative mortality was 5.7% (12 cases, including 4 of the 16 patients who were over 70 yr of age). Among the 199 survivors, 120 could be included in a questionnaire and interview study of the need for eventual elective surgery in such cases. Of these 120, 31 (26%) either had no symptoms or had mild indigestion readily relieved by simple remedies, another 42 (35%) had ulcer symptoms which were not considered severe enough to warrant surgical treatment, and 47 (39%) either required surgery or had been subjected to elective surgery. This group included 4 of 9 with a history of previous perforation, 5 of 6 with previous hemorrhage, 68% of those with a history of ulcer symptoms dating back 5 yr or longer at time of suture, and 47% of gastric ulcer patients. There was no effect of age except possibly in the very old. It is concluded that there is no justification for adopting a policy of immediate definitive surgery in all cases of perforation. Such surgery may be indicated, however, by an ulcer history of 5 years' duration or more, previous or simultaneous hemorrhage, more than one previous perforation, a gastric site, the presence of pyloric stenosis, and large ulcers for which suture is difficult or would produce stenosis.

1322 **EARLY POST-CIBAL SYMPTOMS AFTER SURGERY FOR DUODENAL ULCER.** *(E.)* Nelson, P. G. (Roy. Melbourne Hosp., Australia). *Aust. New Zeal. J. Surg.* 37(3):283-288, 1968.

A retrospective, blind, personal-interview study of the incidence and severity of early post-cibal symptoms (dumping, bilious vomiting, and epigastric fullness) after four different operations for duodenal ulcer was made in 205 patients (178 men and 27 women) treated by two surgeons between 1958 and 1964 (1-6 yr before the interview). The sex and age distribution, average duration of symptoms before operation (10-17 yr) and incidence of previous complications (hemorrhage, perforation, stenosis) were uniform. Among 49 patients subjected to Polya gastrectomy (70-80% resection, usually with creation of a Hoffmeister valve), 7 reported epigastric fullness, 26 had dumping (3 of 26 severe) and 13 had bilious vomiting (3 of 13 severe). Among 46 patients treated by vagotomy and antrectomy (30-40% resection, followed in 34 cases by gastroduodenostomy and in 12 by anterior gastrojejunostomy), 6 reported epigastric fullness, 21 had dumping (4 of 21 severe) and 6 had bilious vomiting (3 of 6 severe). Among 61 patients treated by vagotomy plus pyloroplasty (usually of the Heinicke-Mickulicz type), 3 reported epigastric fullness, 21 had dumping (3 of 21 severe) and 4 had bilious vomiting (2 of 4 severe); this procedure thus produced the lowest overall incidence of postprandial symptoms. Among 49 patients treated by vagotomy plus anterior antecolic gastrojejunostomy, only 1 reported epigastric fullness, 15 had dumping (3 of 15 severe) and 8 had bilious vomiting (3 of 8 severe). Epigastric fullness and dumping thus occurred most often after those procedures involving gastric resection, but the differences are not statistically significant. Severe dumping was seen uniformly in 5-10% of all patients, regardless of the type of operation. This was also true of severe bilious vomiting (3-7%); moderate or mild bilious vomiting did occur significantly more often after gastrectomy (20%) than after the other procedures (3.3-10%), but it is concluded that the type of operation has little influence on the overall incidence of postprandial symptoms. Some of the factors related to the development of these symptoms are discussed, and it is suggested that the factor which is probably of most significance, and which is common to all the operations, is the destruction or bypass of the functional integrity of the pylorus.

1323 CONSIDERATIONS ON THE FREQUENCY OF PEPTIC ULCER AS REVEALED BY AUTOPSY DATA. *(It.)* Stipa, V. and R. Gambarella. *Arch. Atti Soc. Ital. Chir.*, pp. 607-613. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967. 627 pp.

1324 VAGOTOMY IN THE SURGICAL TREATMENT OF DUODENAL ULCER. *(It.)* Valentino, A. and C. Bonzanini. *Arch. Atti Soc. Ital. Chir.*, pp. 614-622. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967. 627 pp.

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1363 BLEEDING PEPTIC ULCERS IN CHILDREN. *(E.)* Lannon, J. (Johannesburg Teach. Hosp., S. Africa) and V. E. Sorour. *S. Afr. Med. J.* 42(12):286-287, 1968.

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1365 ELECTIVE SURGERY FOR DUODENAL ULCER. *(E.)* Burnett, W. (U. Queensland) and H. D. Baillie. *Aust. and New Zealand J. Surg.* 37(3):276-282, 1968.

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See also abstract nos.: 846,934,936,1036,1166,1168,1172,1173,1178

1367 STUDIES OF INTESTINAL MICROFLORA. V. FECAL MICROBIAL ECOLOGY IN ULCERATIVE COLITIS AND REGIONAL ENTERITIS: RELATIONSHIP TO SEVERITY OF DISEASE AND CHEMOTHERAPY. *(E.)* Gorbach, S. L. (New Engl. Med. Ctr. Hosp., Boston, Mass.), L. Nahas, A. G. Plaut, L. Weinstein, J. F. Patterson and R. Levitan. *Gastroenterology* 54(4):575-587, 1968.

Stool samples obtained at regular intervals from 25 patients on normal diets with untreated ulcerative colitis (17 cases) or regional enteritis (8 cases), 12 patients treated with salicylazosulfapyridine (Azulfidine), 10 patients treated with prednisone or ACTH, 30 normal controls, and 10 healthy volunteers receiving Azulfidine or placebo in a double-blind study were cultured under both aerobic and anaerobic conditions on 9 different media; Eugon agar (Difco), Violet red bile agar (Difco), Mycosel agar (BBL), Rogosa SL agar (Difco), MRS agar (Difco), MRS agar (Difco), Tomato juice special agar (Difco), S.F. medium (Difco), Staphylococcus medium no. 110 (Difco), and Blood agar (heart infusion–Difco). Quantitative and qualitative analysis of the results showed that the fecal flora was very similar in normal controls and patients with ulcerative colitis who were only mildly to moderately ill. In 8 patients with regional enteritis and the 5 with ulcerative colitis who were very ill, however, the mean coliform count was 7.7/g and 8.6/g, resp., (logarithmic units), compared to 6.4/g in normal controls and 7.1/g in patients with distal colitis; patients with regional enteritis also showed a decrease in the number of anaerobic lactobacilli. Treatment of ulcerative colitis with Azulfidine tended to increase the numbers of staphylococci, streptococci and both aerobic and anaerobic lactobacilli, but these increases were significant only in the 4 of 12 patients with distal colitis. There was some correlation between the dose of Azulfidine administered and the changes in the fecal microflora, but no correlation between these changes and either the severity of the disease or the effectiveness of treatment. Treatment of diffuse ulcerative colitis (8 cases) or regional enteritis (2 cases) with prednisone or ACTH resulted in little change in the intestinal flora. In some cases, modest decreases in the number of fecal coliforms were associated with clinical improvement. In a double-blind study on 10 healthy volunteers, Azulfidine (1 g 4 times daily for 4 weeks) produced no significant changes in the fecal microflora; side effects were reported, however, by 6 of 7 subjects given the drug, and in 3 of 6 the experiment had to be discontinued because of rash and nausea (2 cases) or diarrhea, proctitis and headache (1 case).

1368 FREE PERFORATION OF THE SMALL BOWEL DUE TO REGIONAL ENTERITIS. [TWO CASES] *(E.)* Robinson, K. P. (Westminster Hosp., London, England) and I. L. Craft. *Brit. J. Surg.* 54(9):799-801, 1967.

1369 INDICATIONS FOR SURGERY IN ACUTE REGIONAL ILEITIS. [CASE REPORT] *(Ger.)* Meyer-Fürst, P. (Canton Hosp., Luzern, Switzerland). *Helv. Chir. Acta* 35(1/2):69-73, 1968.

1370 ADENOCARCINOMA COMPLICATING REGIONAL ENTERITIS: REPORT OF A CASE AND REVIEW OF THE LITERATURE. *(E.)* Cantwell, J. D. (U. Minnesota, Rochester), R. F. Kittering, J. A. Carney and J. Ludwig. *Gastroenterology* 54(4):599-604, 1968.

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1371 **INTESTINAL ABSORPTION STUDIES IN THE AGED.** *(E.)* Pelz, K. S. (Masonic Hosp., Wallingford, Connecticut), S. P. Gottfried and E. Soos. *Geriatrics* 23(4):149-153, 1968.

Fifty patients, aged 62-97 yr, with the usual diseases of old age, were involved in this study to determine whether those with marked physical deterioration, without evidence of organic involvement, had impaired intestinal absorption. Xylose absorption, fecal fat, serum carotene, total protein, and serum albumin levels were measured; liver function tests, such as thymol turbidity, cephalin flocculation, cholesterol and esters, and alkaline phosphatases, were performed in those patients with inverted albumin/globulin (A/G) ratios. Impaired xylose absorption, due to generalized carbohydrate malabsorption, and increased fat excretion, due to decreased pancreatic lipase secretion, were found. No hepatic dysfunction was found in 5 patients with inverted A/G ratios; the inversion may be due to cerebrovascular disease or decreased small intestine proteolytic enzyme secretion.

1372 **READY ABSORPTION OF MEDIUM CHAIN TRIGLYCERIDE IN THE STEATORRHOEA SYNDROME.** *(E.)* Smits, B. J. (Gen. Hosp., Birmingham, England), P. Wilding and W. T. Cooke. *Gut* 9(1):28-33, 1968.

The fecal fat excretion on a normal diet (containing 60-100 g/day of fat, mostly with chain lengths of more than 10 carbon atoms) and on an experimental medium-chain-triglyceride diet was determined in 6 patients (3 men and 3 women, 21-70 yr old) with steatorrhea due to celiac disease (2 cases), diffuse regional enteritis, prior extensive resection of the small bowel, pancreatic insufficiency, and prior total gastrectomy for stomach cancer. The medium-chain triglyceride used was a fractionated coconut oil containing 35.8% caprylic and 55.3% capric acid with a melting point of about 0C. The test diet, which was administered for 7-10 days, contained 110 g per day of this oil plus 300 g of carbohydrate and 125 g of protein; however, only 50-65% of this amount was ingested. On transfer to the experimental diet, the fecal fat excretion decreased markedly in all 6 patients, from an average of 22.1 (11.8-42.4) g/day to 5.0 (3.1-10.2) g/day. It is suggested that this oil may be of value as a dietary supplement in patients with malabsorption of varying etiology. The current concepts regarding the digestion and absorption of fats are reviewed briefly, with particular attention to the effect of chain length.

1373 **CYTOCHEMICAL AND ULTRASTRUCTURAL STUDIES OF THE INTESTINAL MUCOSA OF CHILDREN WITH CELIAC DISEASE.** *(E.)* Biempica, L. (Albert Einstein Coll. Med., Yeshiva U., Bronx, N. Y.), H. Toccalino and J. C. O'Donnell. *Amer. J. Path.* 52(4):795-808, 1968.

Peroral biopsies of the small intestine (Crosby-Kugler capsule) in the region of the ligament of Treitz were performed in 7 normal children, 1-12 yr old, and in 20 children with celiac disease (1.5-12 yr of age), both while on an unrestricted diet and (in 10 cases) after at least 6 months on a gluten-free diet. Cytochemical and electron microscopic studies of columnar cells from the luminal surface in untreated celiac children revealed variable abnormalities affecting all the cytoplasmic organelles. Staining of the striated border for nucleoside phosphorylase and alkaline phosphatase activities was decreased. Many cells lacked microvilli, while others showed fewer and shorter microvilli than the columnar cells from the apex of the villi in normal specimens. The endoplasmic reticulum stained weakly for nucleoside diphosphatase activity. Smooth membranes were infrequent. Granular cisternae were rarely found and were dilated when present. There were numerous free ribosomes, while lysosomes were less numerous than in controls. The Golgi apparatus showed irregular and weak staining for thiamine pyrophosphatase. There were fewer mitochondria than in normal specimens and their NADH-tetrazolium reductase level was reduced. In general, these changes were the same as are generally seen in adults with celiac disease, only more severe. Repeat biopsies of children with celiac disease who had been placed on a gluten-free diet at least 6 months before showed columnar cells which were indistinguishable from those of normal controls. In contrast to the recovery of the columnar cells, however, the mucous tended to remain flattened and the infiltration of the lamina propria persisted. The cytochemical and ultrastructural characteristics of the plasma membranes, endoplasmic reticulum, Golgi apparatus, lysosomes, mitochondria and other cytoplasmic constituents in the columnar cells of normal children are described in considerable detail.

1374 **PERSISTENT DEFICIENCY OF INTESTINAL LACTASE IN APPARENTLY CURED TROPICAL SPRUE.** *(E.)* Gray, G. M. (Stanford U. Sch. Med., Palo Alto, Calif.), W. M. Walter, Jr. and E. H. Colver. *Gastroenterology* 54(4):552-558, 1968.

Among 37 Puerto Ricans with untreated tropical sprue, confirmed by intestinal biopsy, all had intestinal lactase deficiency and 65-68% also had deficiencies in sucrase and maltase Among 48 other Puerto Ricans who had been treated for tropical sprue with folic acid, tetracycline and/or sulfaguanidine for periods of from 3 months to 4 yr, and who no longer had symptoms of malabsorption, megaloblastic anemia, or the typical histological abnormalities in the intestinal mucosa (shortening and broadening of the villi, change of absorptive cells from columnar to cuboidal in type, lymphocytic infiltration), the sucrase and maltase levels were normal but 63% still showed an intestinal lactase deficiency. This compares with a prevalence of 21% among a control group of 28 patients who had irritable colon or idiopathic diarrhea (normal intestinal histology) and whose symptoms disappeared without treatment; these 28 also all had normal maltase and sucrase activities. Among 19 Puerto Ricans who were studied serially both before and during 3-18 months of treatment for tropical sprue, for a mean follow-up period of 10-11 months, 5 had a return to normal lactase activity but 14 showed persistent intestinal lactase deficieicy despite a return of absorptive capacity and normalization of the intestinal histology. There was no significant difference in the two groups with respect to age, symptoms prior to therapy, duration of disease, initial steatorrhea, or number of biopsies; the initial lactase level averaged only 1.7 ± 0.7 U/g in those with persistent deficiency compared to 4.6 ± 1.4 U/g in the others, but this is of borderline significance ($0.1 > P > 0.05$). It appears that lactase deficienc can be caused by either prior intestinal disease or current subclinical illness, and that a finding of such an isolated deficiency may warrant further evaluation of the patient for underlying intestinal disease.

1375 **DIARRHEA ASSOCIATED WITH ADRENAL GANGLIONEUROMA: NEW FINDINGS RELATED TO THE PATHOGENESIS OF DIARRHEA. [CASE REPORT]** *(E.)* Hamilton, J. R. (Res. Inst., Hosp. Sick Children, Toronto, Canada), I. C. Radde and G. Johnson. *Amer. J. Med.* 44(3):453-463, 1968.

1376 **STUDIES OF THE IMMUNOLOGIC DEFECTS ASSOCIATED WITH INTESTINAL LYMPHANGIECTASIA, WITH SOME OBSERVATIONS ON DIETARY CONTROL OF CHYLOUS ASCITES. [CASE REPORT]** *(E.)* McGuigan, J. E. (Washington U. Sch. Med., St. Louis, Mo.), M. L. Purkerson, W. L. Trudeau and M. L. Peterson. *Ann. Int. Med.* 68(2):398-404, 1968.

See also abstract nos.: 926,1177,1251

LARGE INTESTINE

1377 **HERRMANN'S GLANDS AND PATHOLOGY OF THE ANAL CANAL.** *(It.)* Sbuelz, B. (Pius Inst. Holy Spirit, Rome, Italy) and G. Misiti. *Chir. Gastroent.* 2(1):76-84, 1968.

Following a review of the literature on the pathogenesis of perianal abscess, anal fistula and fissure, hemorrhoids, and extramucosal carcinoma of the anal canal, the suggestion is made that many of these lesions may find their origin in inflammatory or neoplastic changes in Herrmann's glands, which are found concentrated in the posterior half of the anus, at the level of the Morgagni crypts, in about 70% of all human subjects. These glands, the embryology, anatomy and histology of which are reviewed, appear in the form of 1-8 tubular or tubulo-acinar formations with all the characteristics of true functioning glands, and are more numerous in man than in other animals. Their inflammation facilitates the spread of an inflammatory process from the anal canal to the anus and anal sphincter, and their role in anal carcinogenesis is indicated by the fact that the mucoepidermoid carcinomas or mucus-secreting adenocarcinomas of this region correspond histologically to the structure of Herrmann's glands. It is acknowledged, however, that other factors probably also play a role.

1378 **THE BEHAVIOR OF THE MAST CELLS IN TUMORS OF THE DIGESTIVE TRACT.** *(It.)* Caschera, F. (Macerata Munic. Hosp., Perugia, Italy) and G. Stocchi. *Ann. Med. Perugia* 58(3):365-369, 1967.

Histological studies on tissue fragments from the periphery of 20 carcinomas of the large intestine revealed an average mast-cell count of 5.23 per 0.04 mm^2, compared to 5.98 for 10 fragments of normal intestinal wall. This insignificant difference is in marked contrast to previously published results for the duodenum, where the neoplastic tissue showed a marked decrease, and for the stomach, where the neoplastic tissue had more mast cells. The mast cells were severely depleted, however, in the center of the large-intestinal tumors (0.54/0.04 mm^2), where the free stromal metachromasia, which is rare in normal intestine and in the tumor periphery, was abundant. It is concluded that the mast cells and their chromotropic granules play no particular role in the growth of intestinal neoplasms, except to contribute to the maturation of the surrounding connective tissue.

1379 **ONE-STAGE PROCTOCOLECTOMY AND ANAL ILEOSTOMY: REPORT OF 35 CASES.** *(E.)* Drobni, S. (U. Med. Sch., Budapest, Hungary). *Dis. Colon Rectum* 10(6):443-448, 1967.

Indications for 35 proctocolectomies were: 31 for ulcerative colitis and 4 for familial polyposis. The operation was completed by a pull-through procedure of the small intestine and establishment of an anal ileostomy. There were 5 deaths, of which 2 were caused by peritonitis, one by mesenteric thrombosis, one by thrombosis of the portal vein and one by postoperative shock. From every point of view, the condition of 27 patients is good. The number of daily evacuations varies from 2-6 and no patient has had trouble with bowel control. Two patients suffer mild inconvenience because of discharging sinuses in the area where the coccyx was removed. The procedure described is quite radical. The mucous membrane of the colonic and rectal remnants is removed. The operation requires approximately two and a half hours. Viability of the pulled-through portion of small intestine can be controlled.

1380 **THE USE OF RADIATION IN THE MANAGEMENT OF CANCER OF THE COLON AND RECTUM.** *(E.)* Wang, C. C. (Harvard Med. Sch., Massachusett Gen. Hosp., Boston). *Geriatrics* 23(4):163-169, 1968.

Radiation therapy, although known to cure malignant disease, has limited use in the management of distal colon and rectal carcinoma due to the low radiosensitivity of the tumors, adjacent organs, and their vasculoconnective tissues. Radiation therapy is used preoperatively as an adjunct to surgery and postoperatively to destroy any remaining cancer and to prevent local recurrence. Palliative radiation therapy is used to relieve symptoms.

1381 **PHYSIOLOGIC CONSEQUENCE OF THE PULL-THROUGH OPERATION.** *(E.)* Kratzer, G. L. (Mayo Found., Rochester, Minn.), J. F. Schlegel and R. G. Elias. *Dis. Colon Rectum* 10(6):449-457, 1967.

Intraluminal pressures of the rectum and anal sphincter were observed at rest and after rectal distension in 19 patients who had undergone a pull-through operation and in 3 healthy controls. A zone of elevated pressure was always identified adjacent to the anal verge in the control subjects. The rectum did not respond to distension, whereas the sphincter relaxed promptly after distention. A zone of elevated pressure was detected in 18 of 19 patients by open-tip detection, and in all 19 by balloon detection. The zone of elevated pressure was adjacent to the anal orifice. Pressures within the zone were of less magnitude and width than those observed in healthy subjects. Colonic distension resulted in colonic contraction in 39% of the patients, "sphincteric" relaxation in 68% and "sphincteric" contraction in 37%.

1382 **FISTULAS AND FISTULOUS ABSCESSES IN THE ANORECTAL REGION: PERSONAL EXPERIENCE IN MANAGEMENT.** *(E.)* Hill, J. R. (Mayo Clinic, Rochester, Minn.). *Dis. Colon Rectum* 10(6):421-434, 1967.

A critical analysis is presented of the records of 626 patients who had fistulas and fistulous abscesses in the anorectal region who were treated by the author during the period 1946 throug 1960. Three patients had supralevator abscesses of extrarectal origin. Twenty-four patients had two, two patients had three, and one patient had four separate fistulas. As to origin, 65% of these suppurative lesions began as infection which involved anal crypts. Seventeen abscesses, 14 of which were believed to be of anal origin, and several fistulas involved supralevator spaces. The tracts of internal fistulas (above the dentate margin) were frequently "incomplete" (69 of 118 cases), whereas the tracts of external fistulas (below the dentate margin were infrequently "incomplete" (19 of 524). One hundred twenty-eight fistulas were found to have multiple (two or more) tracts. Fistulotomy was employed for 482 fistulas or fistulous abscesses, fistulectomy for 172. The amount of sphincteric mechanism cut during the surgical procedures for the 626 patients wa estimated to be: none in 39, minimal in 221, moderate in 287, much to most in 74, and all in five. Four of the 476 patients from whom follow-up information was obtained experienced recurrence of their lesions; seven had problems with wound healing; and 19 complained of varying degrees of difficulty with fecal control.

1383 **PERFORATION IN CANCER OF THE COLON AND RECTUM.** *(E.)* Crowder, V. H., Jr. (Louisiana State U. Sch. Med., New Orleans) and I. Cohn, Jr. *Dis. Colon Rectum* 10(6):415-420, 1967.

When both conditions are present, surgical care of the perforation and its resultant peritonitis or abscess must take precedence over that of the cancer. Among 45 patients studied, the perforation occurred at the site of the tumor in 32. Ten patients were managed by primary resection with a mortality rate of 30%; 16 were managed by colostomy and drainage or a bypass procedure with a mortality rate of 50%. Six patients were moribund on admission and died before any operation could be performed. While the mortality rate would indicate that primary resection is superior to less radical forms of management, it must be recognized that those patients selected for resection were generally in better condition than the others. Perforation occurred proximal to the tumor in 12 patients, 10 of whom underwent an operative procedure. Exteriorization or resection was used in 4 patients, and one died. Cecostomy or closure of the perforation was used in 6 patients, and among these, there were 4 deaths. Exteriorization or resection appear to offer better results.

1384 **LARGE FECALOMAS.** *(E.)* Abella, M. E. (Ciudadela Hosp., Rca, Argentina) and A. T. Fernandez. *Dis. Colon Rectum* 10(5):401-404, 1967.

Two fecalomas of three and four months' duration were seen in patients of different sexes, one of which had to be removed manually. In both cases the bowel was emptied with the help of enemas. A study is made of etiology, symptomatology and diagnosis.

1385 **THE RECTAL SIDE OF THE RECTOCELE.** *(E.)* Marks, M. M. (Menorah Med. Ctr., Kansas City, Mo.). *Dis. Colon Rectum* 10(5):387-388, 1967.

A rectocele may not become symptomatic until physiologic changes of the postmenopausal period occur. Correction of the vaginal deformity alone may not provide sufficient relief because the rectal side of the rectocele will become a source of annoyance. Surgical correction of both vaginal and rectal portions of a rectocele is feasible and can bring more lasting results than utilizing the vaginal procedure alone. Little more operating time is required to repair both deformities adequately, and the same anesthetic can be used. A nonsymptomatic rectocele with troublesome hemorrhoids can be relieved if the surgical procedure is adequate.

1386 **TREATMENT OF COMPLICATED ANAL FISSURES BY SCLEROSING INJECTIONS AND FISSURECTOMY.** *(E.)* Vantrappen, G. (U. Hosp. St. Raphael, Louvain, Belgium), C. Goethals and H. Hendrickx. *Dis. Colon Rectum* 10(5):365-368, 1967.

Fifty-seven patients with complicated anal fissure were treated by sclerosing injections (2.5% solution of quinine and urea; Sclerana) or fissurectomy, or both, under local anesthesia. Fifty of the patients were evaluated after a period of 15 to 54 months. Trials of the sclerosing agent alone had to be supplemented by fissurectomy in 50% of the cases. Healing occurred in not more than 28% of those who were treated with the sclerosing agent alone. Fissurectomy under local anesthesia was successful in 94% of 32 patients. Disturbances of the sphincter did not occur.

1387 **PRIMARY RESECTION OF THE COLON FOR PERFORATING AND OBSTRUCTING LESIONS: A NEW TECHNIC FOR END-TO-END ANASTOMOSIS.** *(E.)* Lewis, M. I. (Queen of Angels Hosp., Los Angeles, Calif.), W. F. Capps, Jr. and D. A. Gazzaniga. *Dis. Colon Rectum* 10(5):352-358, 1967.

A series of 33 cases is presented in which primary resection and anastomosis of the colon was performed in the presence of obstructing and perforating lesions, using a modified, open-bowel anastomosis–a procedure that has had a mortality and morbidity rate equal to that reported in elective resections of the colon with previous bowel preparation. There was only one postoperative death (3%). There were nine postoperative complications (27% morbidity rate). There was one postoperative anastomotic leak which resulted in the death of the patient. In the remaining 32 patients, there was no anastomotic stricture or narrowing. By performing a one-stage resection and anastomosis, the total period of hospitalization was reduced from approximately two months to an average of 15.3 days. A variation of an open end-to-end bowel anastomosis is described which is believed to establish a more secure anastomosis of the posterior wall which accounts for the low incidence of leakage and stricture formation among the patients.

1388 **ENDOMETRIOSIS OF THE INTESTINES.** *(E.)* Burns, F. J. (St. Louis U. Sch. Med., Mo.). *Dis. Colon Rectum* 10(5):344-346, 1967.

Of 360 cases of endometriosis encountered during a 20-yr period at St. Mary's Hospital, there were 35 patients with involvement of the intestinal tract. In this group there was involvement of the pelvic colon in 16 cases, the appendix (10), rectum (5), and ileum (3). Diagnosis of this condition is briefly discussed. The difficulty in diagnosis is indicated by the fact that among 21 with involvement of the rectum or pelvic colon, the correct preoperative diagnosis was made in only 3 of 7 patients who underwent intestinal resection. Fourteen with rectum and colon involvement were not treated or the lesions were destroyed by electrodesiccation.

1389 **DIAGNOSIS AND MANAGEMENT OF MEGACOLON AND MEGARECTUM IN THE ADULT.** *(E.)* Todd, I. P. (London, England). *Dis. Colon Rectum* 11(2):97-101, 1968.

In a review, it is noted that one of the simplest of the megabowels to diagnose in the adult may be the most difficult to treat–the type which is associated with an inadequately-treated congenital imperforate anus. In connection with the difficulties in the diagnosis of many types of megabowel, attention is drawn to a technique of preparing and staining of intestinal plexuses *en face,* instead of in transverse section. This technique has revealed not only relative absence of ganglia but gross distortion of the nerve network. If examination reveals a colon that contracts well, the fault may lie in the rectal or anal sphincters. In megabowel, identification of the narrow segment may require a lateral film and sometimes full-thickness biopsy. Other recommended studies include assessment of transit time, determination of rectal sensation, and determination of pressure needed to inhibit sphincters. A recent classification of megarectum cases included: 1) the enlarged rectum, 2) the expanded rectum, and 3) the inert rectum. The author has suggested that there is a megarectum with hypertrophy and normal tonus, a megarectum with hypertrophy and no tonus, and possibly an asensory rectum. Two patients are mentioned with ganglion degeneration of unknown etiology; drugs may cause degeneration of autonomic ganglia and fibers. Early operation for Hirschsprung's disease is stressed.

1390 TRANSRECTAL PERINEAL REPAIR: AN ADJUNCT TO IMPROVED FUNCTION AFTER ANORECTAL SURGERY. *(E.)* Sullivan, E. S. (Portland, Ore.), G. H. Leaverton and C. E. Hardwick. *Dis. Colon Rectum* 11(2):106-114, 1968.

Attention to combined vaginal and rectal repair was drawn by the favorable response experienced by 21 of 28 patients in an earlier series. A surgical procedure is described to repair perineal defects and rectocele transrectally, either as a primary procedure or in conjunction with other anorectal surgical procedures. This procedure was employed in 151 patients (137 women, 14 men; age range 15-88 yr, median age 44). Follow-up varied from 3 months to 4.5 yr, with an average period of 18.5 months. Gratifying results were obtained in 80% of the patients while complete failure occurred in 3% of the cases. Chief complications were 6 cases of fecal impaction, and 3 each of delayed postoperative bleeding, wound breakdown, and sinus formation.

1391 MUCOCELE OF THE APPENDIX. *(E.)* Hellsten, S. (Cent. Hosp., Växjö, Sweden) and J. E. Gjöres. *Acta Chir. Scand.* 133(6):491-495, 1967.

Experience with 6 personal cases (5 men and 1 woman, 57-84 yr old) demonstrated that the clinical findings in mucocele of the appendix can vary widely. Although a rare disease, its lethal potential necessitates immediate histological verification in suspected cases, followed by radical surgery in case of malignancy. Among the 6 cases, 3 showed no evidence of malignancy (although one had an associated carcinoma of the cecum), one in whom the mucocele caused intestinal obstruction showed suspicious papillary folding of the epithelium and a "fairly exuberant" cell picture, and two (one of whom also had a cecal adenocarcinoma) showed histological signs of muciparous adenocarcinoma of the appendix. In one of these two (with concomitant cholelithiasis), a fatal peritoneal pseudomyxoma developed. Examination of the appendix is urged after every appendectomy.

1392 OBSTRUCTING ADENOCARCINOMA OF THE RIGHT SIDE OF THE COLON. *(E.)* Thompson, R. W. (Stanford U. Sch. Med., San Jose, Calif.) and J. B. D. Mark. *Arch. Surg.* 96(1):100-103, 1968.

A review of the 100 cases of histologically proven carcinoma of the colon and rectum seen between 1/1/63 and 3/31/67 at the Santa Clara Valley Medical Center revealed that 69 were in the left colon or rectum, 5 in the transverse colon and 26 (16 men and 10 women, 45-85 yr old) in the right colon (19 in the cecum and 7 in the ascending colon). All of the latter were adenocarcinomas, usually presenting as vague lower abdominal pain and weight loss, and in 7 cases (6 males and 1 female, 52-84 yr old) there were clinical and radiological signs of distal small-bowel obstruction. Four of these cases required emergency surgery; laparotomy and pathology revealed 2 annular carcinomas of the cecum, 2 perforated cecal carcinomas, 1 cecal carcinoma comprising the lumen, and 2 carcinomas of the ascending colon. It is emphasized that obstructing carcinoma of the right colon should be considered in patients presenting with distal small-bowel obstruction.

1393 ENTEROCOLITIS IN INTESTINAL DYSBACTERIOSIS SIMULATING THE "ACUTE ABDOMEN" SYNDROME. *(Rus.)* Skatin, L. I. (Saratov Med. Inst., USSR) and Z. M. Maslova. *Sovet. Med.* (2):72-75, 1968.

On the basis of a detailed discussion of 7 cases (4 presented in full) of acute nonspecific enterocolitis developing in patients with disruption of the intestinal flora after inappropriate antibiotic therapy or intestinal trauma, it is concluded that the syndrome is allergic in nature. The clinical picture (fever, tachycardia, hypotension, cyanosis, meteorism, watery stools and eosinophilia) combines symptoms of enterocolitis, peritonitis and intestinal obstruction, and the proper choice of therapy (which should be basically desensitizing) depends heavily on the bacteriological findings. Among the 7 cases discussed, two developed against a background of chronic nonspecific inflammation of the large intestine, two followed surgery, and two (in women) followed delivery. At least two of the patients died. Culture of the feces revealed staphylococci in only 3 cases, the others either being negative or showing enterococci and *Proteus.*

1394 SHOULD WE REEXAMINE THE TECHNIQUE FOR APPENDECTOMY? *(Rus.)* Komorovskii, Iu. T. (Ternopol Med. Inst., USSR) and V. F. Oleinik. *Klin. Khir.* (2):50-56, 1968.

A comparative bacteriological study of 100 appendectomy patients, 1-80 yr of age, revealed that the stump of the appendix was sterile in 39 of 50 cases after electrosurgery compared to only 12 of 50 cases after conventional ligation and treatment with iodine; 5 of the latter and none of the former showed profuse bacterial growth. Similarly, the mesentery stump was sterile in 41 of 50 cases treated by electrosurgery and only 3 of 50 cases treated in the conventional way (profuse bacterial growth in 6 of 50), and the serosa of the sigmoid colon was also more often sterile after electrosurgery. It is noteworthy that the mesentery stump was contaminated with microorganisms almost as frequently and as severely as the stump of the appendix itself, even though only the latter is usually tied off and treated with iodine (an ineffective procedure at best) while the former is generally ignored as a focus of subsequent peritoneal infection. The conventional appendectomy technique thus leaves two potential sources of infection within the abdominal cavity, which probably contributes to the high incidence of adhesions after this operation. This relationship was confirmed by a follow-up of 305 patients (117 males and 188 females, 1-80 yr old) treated by the electrosurgical technique for chronic, catarrhal, phlegmonous, gangrenous or perforating appendicitis. All recovered, and not only were there no complications referrable to the operation but the absence of postoperative abdominal pain was striking. This result is ascribed both to the eradication of foci of infection and to the coagulation of the nerve fibers in the mesentery.

1395 **EFFECT OF ADRENALECTOMY AND ADMINISTRATION OF DESOXYCORTICOSTERONE ON THE COURSE OF EXPERIMENTAL INTESTINAL OBSTRUCTION.** *(Rus.)* Synovets, A. S. (Odessa Med. Inst., USSR). *Klin. Khir.* (2):40-42, 1968.

In adult white rats, ligation of the descending colon 5 cm from the cecum was followed by a mortality of 15% during the 1st day and more than 30% during the 2nd day. Although the blood electrolyte levels remained about normal for the 1st day, thanks to the compensatory function of the adrenal cortex, the amount of intravenously injected radiosodium or radiochlorine excreted into the intestine was increased from 0.5%/hr in controls to more than 12%/hr after 24 hr of intestinal obstruction and 22%/hr after 48 hr of obstruction. In rats in which adrenalectomy was performed at the same time as intestinal ligation, the mortality rate was 67/ in 2 days, and 23% of intravenously injected isotope was excreted into the intestine in one hr after 48 hr of obstruction. On the other hand, in rats given 2.5 mg of desoxycorticosterone acetate i.m. at the time of ligation, there were no deaths and the loss of sodium and chlorine was reduced by 50% (excretion of 6%/hr after 24 hr and 12%/hr after 48 hr). Since desoxycorticosterone also stimulates the urinary excretion of potassium, it is highly recommended for trial in cases of intestinal obstruction.

1396 **THE RESULTS OF TREATMENT IN CARCINOMA OF THE COLON.** *(Ger.)* Hofmann, W. (Surg. Clin., Martin-Luther U., Halle-Wittenberg, Germany). *Chirurg* 39(3):125-129, 1968.

Among 82 patients (43 men and 39 women, 21-90 yr old, average 61) admitted for carcinoma of the colon in the period 1956-65, the average duration of symptoms was 31.8 weeks; 28% had lymphogenic metastasis, 16% had hematogenic metastasis, 9% had direct involvement of neighboring organs, and 19 cases had already developed ileus (12 of these 19 were among the early deaths). With respect to tumor site, 23.2% were in the cecum, 19.5% in the sigmoid, and 13.4% in the transverse colon. With regard to the most important clinical symptoms, constipation, diarrhea, intestinal spasm, ileus, and especially vomiting were all more common in the 25 patients with cancer of the left colon, while melena, anemia, weight loss, and decreased working capacity were more common in the 57 patients with cancer of the right and transverse colon. The 82 patients were hospitalized for an average of 46 days. While 13 were totally inoperable, palliative surgery could be performed in 29 cases, and 40 tumors (48.8%) could be resected. It is noted that the resection rate was 16.5% higher during 1961-65 than during 1956-60, due probably to improvements in diagnostic and surgical technique and not to any tendency on the part of the patients to seek medical care earlier in the disease. Of the 40 operations, 32 were completed in one session, 6 required 2 sessions, and 2 required 3 sessions. Hemicolectomy was used in 24 cases, resection plus end-to-end anastomosis in 11, and the Mikulicz procedure in 3. Although 7 died during or or soon after surgery and 5 died later of recurrences, 28 (34.2% of the total) have survived and are free of recurrence after periods of 2-11 yr. It is pointed out that there is a relationship between the extent of the original tumor and the recurrence rate. Thus, 19 of the 28 successfully resected tumors were limited to the intestinal wall, while 10 of 12 fatal cases had either broken through the intestinal wall or produced lymph node metastasis. It is felt that earlier recognition would be the only effective way to increase the survival rate in carcinoma of the colon.

1397 **ACUTE APPENDICITIS AS A CAUSE OF SURGICAL EMERGENCIES IN THE ELDERLY PATIENT.** *(It.)* De Vecchi Pellati, M. (Fatebenefratelli-Fatebenesorelle Hosp., Ciceri Agnesi, Milan, Italy), W. Rossi and F. Trupiano. *Chir. Ital.* 19(1):114-122, 1967.

The 637 patients treated for acute appendicitis during the period 1959-65, about half of whom were below the age of 30, included 47 (14 men and 33 women) who were over 70 yr of age. This represented 20.88% of all operations performed on patients over the age of 70 during this period. Among these 47 patients, 7 had the catarrhal form of appendicitis, 9 had phlegmonous appendicitis with circumscribed peritonitis, and 31 had gangrenous appendicitis with diffuse peritonitis. The time between first symptoms and surgery was less than 12 hr in 5 cases, 12-72 hr in 35 cases, and more than 72 hr in 7 cases. All had pain, both spontaneous and induced by palpation, while only about half presented with fever and vomiting, and only 18 had abdominal rigidity. All were treated by appendectomy followed by cleansing of the abdominal cavity, broad-spectrum antibiotics, and in some cases a Penrose drain. The average hospital stay was 13 days and the mortality rate was 18%. The only significant complication was 5 cases of bronchopneumonia (one fatal). A right pararectal incision is recommended in these cases, as well as early ambulation (on the first or second postoperative day) and administration of drugs to stimulate peristalsis.

1398 **HIRSCHSPRUNG'S DISEASE: CURRENT STATUS.** *(E.)* Miller, F. E. (U. Iowa Coll. Med., Iowa City) and R. T. Soper. *J. Iowa Med. Soc.* 58(4):370-376, 1968.

The clinical manifestations of congenital aganglionic megacolon (Hirschsprung's disease) simulate those of large bowel obstruction. In a review of 30 patients, aged 1 day to 21 yr, histologically diagnosed by transanal rectal wall biopsy, all deaths attributed to the disease and its complications occurred in infants 1-2 months old. Acute enterocolitis, colon perforation, malnutrition-sepsis, aspiration pneumonia, and small bowel obstruction caused death in 7 out of 11 patients with complications. Surgical management (colostomy) is performed in ganglionated bowel to relieve colonic hypertrophy and dilation, to treat or prevent perforation and enterocolitis, and to improve the patient's nutritional status; 14 out of 30 patients underwent a modified Duhamel bypass procedure, with no mortality and low morbidity. Early diagnosis and an aggressive attitude toward surgical correction reduce the high mortality rate associated with congenital aganglionic megacolon.

1399 **ENDOSCOPIC PHOTOGRAPHY AS RELATED TO PROCTOLOGY.** *(E.)* Kaplan, B. J. (Hartford, Conn.) and W. K. Bender. *Dis. Colon Rectum* 11(2):102-105, 1968.

Fiber optic bundle illumination, providing high and low intensity lighting, and improved lens systems, producing larger and sharper images for proctological examinations and photography, have led to the use of endoscopic photography in routine sigmoidoscopy. This photographic documentation serves as an adjunct to medical recording and is a valuable teaching aid.

1400 **TRANSABDOMINAL COLONOSCOPY WITH THE SUCTION-LAVAGE SIGMOIDOSCOPE.** *(E.)* Wasserman, I. F. (Utica, N. Y.). *Dis. Colon Rectum* 11(2):120-123, 1968.

Colonoscopy utilizing a suction-lavage sigmoidoscope provides a more accurate diagnosis than X-rays and eliminates the chief complications following colotomy and polypectomy. A thoroughly cleansed colon, intestinal sterilization, an adequate abdominal incision, careful protection of the surgical wound, proper and adequate instrumentation, and meticulous wound closure techniques are criteria for successful colonoscopy. The widespread use of suction-lavage endoscopy will lessen the risk of intestinal contamination and infection and reduce the present morbidity rate.

1401 **PREOPERATIVE DIAGNOSIS OF STRANGULATED OBTURATOR HERNIA.** *(E.)* Archampong, E. Q. (Queen Elizabeth II Hosp., Welwyn Garden City, England). *Postgrad. Med. J.* 44(5):140-143, 1968.

The case histories of 6 patients (aged 64-87 yr) are presented to show the difficulties in preoperatively diagnosing strangulated obturator hernia. Better surgical results are obtained if the sac is completely removed; failure to remove sac will cause recurrent hernia and strangulation. Preoperative diagnosis is essential to improved results following treatment.

1402 **DIVERTICULAR DISEASE.** *(Fr.)* Connell, A. M. (Queen's Univ., Belfast, U. K.). *Acta Gastroent. Belg.* 30(10): 695-703, 1967.

Recent studies on the motility of the large intestine in diverticular disease, and etiological hypotheses based on these studies, are reviewed. Thus, comparative studies on intracavitary pressure, using small balloons placed in the sigmoid colon, showed little difference between 19 controls and 25 patients with diverticular disease, although the "motility index" following food or prostigmine was somewhat lower in 25 patients with "irritable colon." This finding is in contrast to earlier catheter studies which indicated hyperexcitability of the sigmoid musculature in diverticular disease, and suggests that the results of such studies depend mainly on the diameter of the intestinal lumen. However, the frequency of intestinal contractions was abnormal in the patients with diverticular disease, with an increased responsiveness to prostigmine which resembled that seen in "irritable colon." Measurements of tension in the wall of the colon during distention by large balloons showed that the intestinal musculature is apparently weaker in patients with diverticular disease than in controls, which agrees with the increasing incidence of diverticular disease with age. Therefore, despite the increased thickness of the affected musculature in diverticular disease, diverticula may be the result of normal intraluminal pressures acting on a deficient musculature, rather than of increased intraluminal pressures.

1403 **THE FUNCTIONAL RESULTS OF SURGERY ON THE ASCENDING COLON.** *(It.)* Ricceri, R. (Inst. Gen. Clin. Surg. & Surg. Ther., U. Rome, Italy). *Chir. Gastroent.* 1(4):461-492, 1967.

Following a review of the functions of the ascending colon (absorption and stool formation) under normal and pathological conditions, follow-up data are presented and analyzed on some of the 206 surgical patients treated by right hemicolectomy (166 cases), ileotransversostomy (20 cases), or other procedures during the period 1947-66. The group included 140 cases with malignant tumors (mostly men in the younger age groups, but equal numbers of men and women after the age of 60), 4 with benign tumors, and 62 with nonneoplastic diseases (including 34 with regional ileitis; here the male sex predominated, except that both sexes were equally affected during adolescence). Complete cures were achieved in 192 cases, including all of the 62 with nonneoplastic conditions. Follow-up data on 67 cases (including 44 cancer patients) revealed 7 deaths (including 6 of metastasis 1-16 yr postoperatively); 5 of the 38 cancer patients who survived had metastasis 0.5-9 yr postoperatively, while 33 were apparently cured. The functional results of right hemicolectomy in these 33 cancer patients are then contrasted with the follow-up findings in 14 patients operated on for terminal ileitis. After an initial period characterized by abdominal pain and weight loss, 70-80% of the cancer patients showed good general condition, weight gain, normal stools and urine, normal nutrition, and normal digestion. The laboratory findings also returned to normal in most, following initial anemia and leukocytosis, evidencing good intestinal function and normal bodily equilibria. In the ileitis patients, the reestablishment of normal nutrition and digestion with resultant weight gain and good general condition took place more slowly than in the cancer patients, and many showed persistent weight loss, oliguria, diarrhea, dyspepsia, and abdominal pain. Similarly, many of the ileitis patients showed persistent or recurrent anemia, leukocytosis, hypopotassemia and hyponatremia. The lack of effective compensation following right hemicolectomy in many cases of regional ileitis is ascribed to two principal factors: the abnormality of the intestinal segments involved in the anastomosis and the inability of the small intestine to assume the extra burdens. The point is made that the functions of the ascending colon must be assumed largely by the ileum, not the descending colon.

1404 **ACUTE IRRADIATION PROCTITIS IN MAN: DEVELOPMENT OF EOSINOPHILIC CRYPT ABSCESSES.** *(E.)* Gelfand, M. D. (Yale U. Sch. Med., New Haven, Conn.), M. Tepper, L. A. Katz, H. J. Binder, R. Yesner and M. H. Floch. *Gastroenterology* 54(3):401-411, 1968.

The 11 patients studied received 4000-5200 rads to the anterior wall and 1000-3600 rads to the posterior wall for the treatment of malignancy of the pelvis. The patients were studied at days

0, 10 and 20 during radiation therapy. Three-fourths developed symptoms such as diarrhea, mucoid rectal discharge, and tenesmus during therapy. In one-half of the subjects abnormal mucosa was seen sigmoidoscopically, characterized by edema, duskiness, and loss of vascularity. The rectal mucosa in biopsy specimens taken during X-ray treatment was abnormal in every case. Leukocytic infiltration of the lamina propria and dysplasia of the superficial and crypt epithelium with a prominent tissue eosinophilia were noted. Previously undescribed eosinophilic crypt abscesses were found in 9 patients. Histochemical study revealed a luminal pattern of nicotinamide adenine dinucleotide phosphate dehydrogenase in 3 subjects. The histological abnormalities were more severe early in the course of radiation therapy suggesting that the bowel is able to adapt to an injurious stimulus. One month following therapy the mucosa had returned remarkably toward normal.

1405 **DISTRIBUTION OF IMMUNOGLOBULINS IN HUMAN RECTAL MUCOSA: I. NORMAL CONTROL SUBJECTS.** *(E.)* Gelzayd, E. A. (Dept. Med., U. Chicago, Ill.), S. C. Kraft and J. B. Kirsner. *Gastroenterology* 54(3):334-340, 1968.

Eight normal subjects were studied utilizing a simplified technique for determining the number of pyroninophilic and immunoglobulin-containing cells per unit area of interstitial tissue in the rectal mucosa. Histologically normal proctoscopic biopsy sections were stained with methyl green-pyronin and fluorescein-labeled monospecific antisera against various human immunoglobulins. Cell density indices for pyroninophilic cells exceeded the sum of the cell density indexes for immunoglobulin cells in each subject. IgA-containing cells predominated over IgM, IgG, and IgD cells. These quantitative histological and immunohistochemical data provide normal values for continuing studies of local immunological processes in the normal and diseased gastrointestinal tract. In addition, IgA repeatedly was identified within the apical portion of the cytoplasm of epithelial cells of rectal mucosal glands. The predominance of IgA in gastrointestinal tissues and secretions and the finding of intraepithelial cell IgA support the concept of a unique type of local IgA system, the biological importance of which remains unknown.

1406 **DISTRIBUTION OF IMMUNOGLOBULINS IN HUMAN RECTAL MUCOSA: II. ULCERATIVE COLITIS AND ABNORMAL CONTROL SUBJECTS.** *(E.)* Gelzayd, E. A. (Dept. Med., U. Chicago, Ill.), S. C. Kraft, F. W. Fitch and J. B. Kirsner. *Gastroenterology* 54(3):341-347, 1968.

This study endeavored to identify and quantitate the major classes of immunoglobulins in rectal mucosal biopsies from 9 adults with quiescent or mildly active ulcerative colitis and 7 abnormal mucosal control subjects. Serial sections were stained with hematoxylineosin, methyl green-pyronin, and fluorescein-conjugated monospecific antisera to human serum immunoglobulins. As in normal and abnormal control subjects, IgA was demonstrated within the apical portion of the cytoplasm of rectal mucosal epithelial cells in all ulcerative colitis tissues. Although IgA cells predominated over IgM-, IgG-, and IgD-containing cells, the population density of IgA cells in the lamina propria of the rectal mucosa in ulcerative colitis was lower than in normal rectal tissues. Unlike control subjects, in ulcerative colitis IgA commonly was present in extracellular interstitial mucosal sites and IgA-containing cells were distributed irregularly and some fields showed very few IgA cells. The mean number of IgG cells per unit area of mucosal interstitium also was reduced in ulcerative colitis rectal tissues. The ulcerative colitis patients and the two control groups showed no staining differences for IgM and IgD.

1407 **UNSUSPECTED ANAL CANCER DISCOVERED AFTER MINOR ANORECTAL SURGERY.** *(E.)* Grodsky, L. (U. California Sch. Med., San Francisco). *Dis. Colon Rectum* 10(6):471-478, 1967.

A series of 5 brief case reports are presented in which anorectal operations were performed for various conditions: hemorrhoids, rectal mucosal prolapse, condyloma accuminata. Subsequent examination of pathological specimens showed the presence of foci of squamous cell carcinoma (2), cloacogenic cancer (1), basal cell cancer (1) and squamous cell anaplasia and residual carcinoma *in situ* (1). Follow-up in one case was complicated by the fact that the individual pieces of tissue had not been tagged as to site. In view of the possibility of cancer, it is suggested that before surgery, preliminary biopsy should be performed on all suspect areas in the anorectal region.

1408 **RECTOCELE: A CAUSE OF ANORECTAL PATHOLOGIC CHANGES IN WOMEN.** *(E.)* Pitchford, C. A. (Riverside, Calif.). *Dis. Colon Rectum* 10(6): 464-466, 1967.

During a 5-year period 219 patients were operated upon because of hemorrhoids or anal ulcer; 104 were women and 115 were men. Of 78 women with hemorrhoids, 40% had an associated symptomatic rectocele and, of 26 with anal ulcer, 46% had associated rectocele. The following operations were performed in the group of women: fistulotomy (5); repair of cystocele (5); and one each excision of cervical stump, repair of rectovaginal fistula, and vaginal hysterectomy with anterior and posterior repair. It is advised that the rectocele be repaired at the time of surgery for the anorectal disease.

1409 **CANCER OF THE RECTUM: PROGRESS IN ITS CONTROL.** *(E.)* Stearns, M. W., Jr. (New York City). *Dis. Colon Rectum* 11(1):1-8, 1968.

Improvement in survival rates of rectal cancer patients is proportional to increased resectability due to improved preoperative and postoperative care, increased understanding of surgical physiology, improved anesthesia, and wider application of skillful surgical procedures. When resectability rates failed to rise, survival rates failed to improve also. Efforts to modify surgical techniques were based on increasing the amount of tissue removed and eliminating permanent abdominal colostomy. Although others have found that abdominopelvic lymphadenectomy improved survival rates and decreased morbidity, this investigator was unable to demonstrate either finding. Abdominoperineal proctosigmoidectomy and anterior resection with primary anastomosis yield survival rates as good as those obtained with the Miles type resection and colostomy, when employed for patients with comparable tumor location and disease progression. Conservative treatment has been recommended by Jackman in treating certain forms of rectal cancer. However, he does not advocate conservative methods in treating clinically-infiltrating carcinoma: coagulation of rectal cancer has not been proved to produce an immunologic response capable of controlling metastases. Although some investigators have reported improved survival rates and no disease recurrence using fluoropyrimidines and 5-fluorouracil as adjuncts to surgery, further research is required to corroborate their results. The prognosis was improved when small doses of radiation were given preoperatively. Controlling rectal cancer requires diagnosis and treatment in the symptomatic period also. In many instances, cancer of the terminal colon has its origin in polyps arising "de novo" from the mucosa. Therefore, removal of polyps before infiltration and invasion constitutes true cancer prophylaxis.

1410 MOTILITY OF THE INTACT HUMAN COLON. *(E.)* Bloom, A. A. (New York Vet. Admin. Hosp., N. Y.), P. LoPresti and J. T. Farrar. *Gastroenterology* 54(2):232-240, 1968.

Colonic motility and intraluminal pressure were studied by telemanometry in 28 normal patients and 23 patients with various gastrointestinal disorders. Telemanometer transit through the colon was intermittent; it passed into the stool within 48 hr after ingestion in most instances. Low amplitude and short duration intraluminal waves characterized the colon in ulcerative colitis and the irritable bowel syndrome. The colon of patients with constipation has the same or slightly greater activity than that of controls. The presence of a physiological gradient accounting for the right to left movement of colonic contents was suggested by the observation of wave forms of higher amplitudes (simple and complex waves) and longer durations (simple waves only) than their counterparts in the left colon. Complex waves of longer duration and greater activity are not consistent with, but do not exclude, the concept of a right to left gradient.

1411 FUNCTIONAL DATA IN RADIOLOGICAL COLON EXPLORATION. *(Fr.)* Gleize-Rambal, L. (Marseille, France). *J. Med. Paris* 87(3):83-91, 1967.

1412 CONSERVATION OF ELECTROLYTES AND WATER BY THE HUMAN COLON. [ORAL COMMUNICATION; 40TH ANNUAL MEETING, CENTRAL SOC. CLIN. RES.] *(E.)* Devroede, G. J. (Rochester, Minn.) and S. F. Phillips. *J. Lab. Clin. Med.* 70(6):990-991, 1967.

1413 OBSTRUCTION OF THE RECTOSIGMOID AND SIGMOID FLEXURE AFTER RADICAL CYSTECTOMY FOR CANCER OF THE BLADDER: REPORT OF EIGHT CASES. *(E.)* Quan, S. H. Q. (Mem. Hosp., New York, N. Y.) and W. F. Whitmore. *Dis. Colon Rectum* 10(6): 458-463, 1967.

1414 CHRONIC DIVERTICULITIS WITH PERFORATION AND ASSOCIATED CARCINOMA OF THE CECUM. [CASE REPORT] *(E.)* Tolley, J. A., III (Ross-Loos Clin., Los Angeles, Calif.). *Dis. Colon Rectum* 10(5):389-393, 1967.

1415 NONNEOPLASTIC OBSTRUCTIVE LESION OF THE LEFT COLON: REPORT OF A CASE. *(E.)* Yadoo, S. (Beilinson Med. Ctr., Petah Tikva, Israel), P. Nathan and L. Dollberg. *Dis. Colon Rectum* 10(5):369-375, 1967.

1416 POLYP OF THE COLON POSSESSING FEATURES OF COLITIS CYSTICA PROFUNDA. [CASE REPORT] *(E.)* Fechner, R. E. (Baylor U. Coll. Med., Houston, Texas). *Dis. Colon Rectum* 10(5):359-364, 1967.

1417 LEIOMYOSARCOMA OF THE RECTUM: REPORT OF A CASE. *(E.)* Diamante, M. (Temple U. Med. Ctr., Philadelphia, Penna.) and H. E. Bacon. *Dis. Colon Rectum* 10(5):347-351, 1967.

1418 PRIMARY LINITIS PLASTICA OF THE COLON: REPORT OF A CASE AND REVIEW OF THE LITERATURE. *(E.)* Sizer, J. S. (Faulkner Hosp., Boston, Mass.), P. L. Frederick and M. P. Osborne. *Dis. Colon Rectum* 10(5):339-343, 1967.

1419 THE USE OF LIDOCAINE INFILTRATION ANESTHESIA AS AN ADJUNCT TO GENERAL ANESTHESIA IN ANORECTAL SURGERY. *(E.)* Faso, J. M. (Erie, Penna.). *Dis. Colon Rectum* 10(6):479-480, 1967.

1420 COMPOSITE CARCINOID TUMOR (ARGENTAFFINOMA - ADENOCARCINOMA) OF THE COLON: REPORT OF TWO CASES. *(E.)* Bates, H. R., Jr. (Richmond Mem. Hosp., Va.) and L. F. Belter. *Dis. Colon Rectum* 10(6):467-470, 1967.

1421 BASAL CELL CARCINOMA OF THE ANUS: REPORT OF TWO CASES. *(E.)* Rosenthal, D. (Long Island Jewish Hosp., Queens Hosp. Ctr., Jamaica, N. Y.). *Dis. Colon Rectum* 10(5):397-400, 1967.

1422 PROBLEMS OF COLON SURGERY [SYMPOSIUM]. *(E.)* Remington, J. H., H. G. Ungley, W. H. ReMine, M. W. Sterns and F. L. Weakley. *Dis. Colon Rectum* 11(2):137-150, 1968.

1423 MANAGEMENT OF HEMORRHOIDAL DISEASE [SYMPOSIUM]. *(E.)* Rowe, R. J., H. G. Benjamin, J. Q. McGivney, J. P. Nesselrod, R. V. Terrell and I. P. Todd. *Dis. Colon Rectum* 11(2):127-136, 1968.

1424 CONTRIBUTION TO THE STUDY OF THE PATHOGENESIS OF DIVERTICULA AND THEIR MORBID ASSOCIATIONS. *(Fr.)* Monod, E. *Sem. Hop. Paris* 44(8/2):529-541, 1968.

1425 PROLAPSE OF THE VAGINA IN ASSOCIATION WITH RECTAL PROCIDENTIA. *(E.)* Amico, J. S. (State U. New York, Downstate Med. Ctr., Brooklyn) and A. W. M. Marino, Jr. *Dis. Colon Rectum* 11(2):115-119, 1968.

1426 SQUAMOUS-CELL CARCINOMA OF THE COLON AND RECTUM: REPORT OF A CASE. *(E.)* Gaston, E. A. (Boston U. Med. Ctr., Mass.). *Dis. Colon Rectum* 10(6):435-442, 1967.

1427 THE USE OF RADIATION IN THE MANAGEMENT OF CANCER OF THE COLON AND RECTUM. *(E.)* Wang, C. C. (Harvard Med. Sch., Cambridge, Mass.). *Geriatrics* 23(4):163-169, 1968.

1428 PROCTOSCOPIC PERFORATION OF THE LARGE BOWEL. *(E.)* Befeler, D. (St. Vincent's Hosp. & Med. Ctr., New York City). *Dis. Colon Rectum* 10(5):376-378, 1967.

1429 LARGE BOWEL ANOMALIES IN MYOTONIA CONGENITA WITH AUTOSOMAL RECESSIVE INHERITANCE. *(Ger.)* Kuhn, E. (Med. Polyclin. U. Heidelberg, Germany) and V. Schneider. *Schweiz. Med. Wschr.* 98(4):114-116, 1968.

1430 INTESTINAL OBSTRUCTION. *(Sp.)* Correa, J. (Carlos J. Bello Hosp., Caracas, Venezuela), T. E. Landaeta and S. Beker G. *G.E.N.* 22(2):141-145, 1967.

1431 INTESTINAL LYMPHANGIECTASIA. [CASE REPORT] *(E.)* Cohen, W. N. (State U. Iowa Coll. Med., Iowa City). *Radiology* 89(6):1080-1082, 1967.

1432 UNUSUAL ROENTGENOGRAPHIC MANIFESTATIONS OF MUCOCELE OF THE APPENDIX. [CASE REPORT] *(E.)* Karakuc, R. J. (William Beaumont Hosp., Royal Oak, Mich.). *Radiology* 89(5):886-887, 1967.

1433 APPENDICEAL CALCULI RESEMBLING GALLSTONES. [CASE REPORT] *(E.)* Fuller, F. W. (St. Barnabas Med. Ctr., Livingston, N. J.) and W. G. Bernhard. *Ann. Surg.* 167(1):101-105, 1968.

1434 SURGICAL TREATMENT OF HIRSCHSPRUNG'S DISEASE: PERSISTENT OBSTRUCTION ASSOCIATED WITH A RETAINED TRANSITIONAL SEGMENT. [FOUR CASES] *(E.)* Spencer, R. (Louisiana State U. Sch. Med., New Orleans) and A. M. Cotlar. *Amer. Surg.* 34(1):35-38, 1968.

1435 INTRAMURAL HEMATOMA OF THE COLON FOLLOWING BLUNT TRAUMA TO THE ABDOMEN. [CASE REPORT] *(E.)* Nance, F. C. (Louisiana State U. Sch. Med., New Orleans) and V. H. Crowder. *Amer. Surg.* 34(1):85-87, 1968.

1436 DELAYED PERFORATION OF LARGE BOWEL DUE TO UNUSUAL INGESTED FOREIGN BODY. [CASE REPORT] *(E.)* Gaur, D. D. (Bombay Hosp., India). *Brit. Med. J.* 4(5578):532, 1967.

1437 NEOPLASIA COMPLICATING URETEROSIGMOIDOSTOMY. [TWO CASES] *(E.)* Kille, J. N. (Queen Elizabeth Hosp., Birmingham, England) and S. Glick. *Brit. Med. J.* 4(5582):783-784, 1967.

1438 LYMPHOGRANULOMATOSIS OF THE RECTUM. [CASE REPORT] *(Ger.)* Roth, A. (Canton Hosp., Chur, Switzerland). *Helv. Chir. Acta* 35(1/2):249-251, 1968.

1439 HEMANGIOMA OF THE RECTUM. *(Rus.)* Luzhnov, K. V. (Itkutsk Med. Inst., USSR). *Khirurgiia (Moskva)* 44(1):127-129, 1968.

1440 HEMORRHAGIC RECTOCOLITIS: ETIOPATHOGENIC PROBLEMS AND TREATMENT. *(Fr.)* Bernier, J. J. *Concours Med.* 90(10):1983-1990, 1968.

1441 DIAGNOSIS AND MEDICAL TREATMENT OF COLITIS. *(E.)* Raddin, J. B. (Phoenix, Ariz.). Berkeley, Berkeley Scient. Publ., 1965. 76 pp.

1442 BENIGN ULCER OF THE SIGMOID COLON: AN UNUSUAL LESION THAT CAN SIMULATE CARCINOMA. *(E.)* Bravo, A. J. (Yale U. Sch. Med., New Haven, Conn.) and R. M. Lowman. *Radiology* 90(1):113-115, 1968.

1443 NEW COLON-CLEANSING AGENT IN THE ROENTGENOLOGIC INVESTIGATION OF THE COLON. *(E.)* Blatt, E. S. (U. Cincinnati Med. Cent., Ohio) and B. Felson. *Radiology* 90(1):153-154, 1968.

1444 DIAGNOSIS AND OPERATIVE TREATMENT OF RETROPERITONEAL TUMORS. *(Rus.)* Romarov, A. S. (S. M. Kirov Med. Inst., Gor'kiy, USSR) and M. S. Vainshtein. *Khirugiia (Moskva)* 44(1):70-74, 1968.

1445 POLYPS AND POLYPOSIS OF THE RECTUM AND LARGE INTESTINE IN AMEBIASIS. *(Rus.)* Emirov, N. A. (Dagestan Med. Inst., Makhachkala, USSR). *Khirurgiia (Moskva)* 44(1):66-70, 1968.

1446 CANCER OF THE VERMIFORM APPENDIX AND CECUM IN CONNECTION WITH APPENDICITIS. *(Rus.)* Chulanov, B. I. (Irkutsk Med. Inst., USSR). *Khirurgiia (Moskva)* 44(1):63-66, 1968.

1447 ANTINEOPLASTIC DRUG THERAPY OF PATIENTS WITH CANCER OF THE LARGE INTESTINE. *(Rus.)* Bazhenova, A. P. (Moscow Sci. Res. Oncol. Inst., USSR). *Khirurgiia (Moskva)* 44(1):7-14, 1968.

1448 20-YEAR EXPERIENCE IN THE SURGICAL TREATMENT OF RECTAL CANCER. *(Rus.)* Aminev, A. M. (Kuibyshev Med. Inst., USSR) and S. A. Rodkin. *Khirurgiia (Moskva)* 44(1):14-20, 1968.

1449 CONGENITAL ATRESIA OF THE COLON. *(E.)* Lee, S. S. (Yonsei U. Coll. Med., Seoul, Korea), K. Y. Kim and P. W. Hong. *JAMA* 202(13):1148-1150, 1967.

1450 COLOSTOMY CARE. *(E.)* Hughes, B. and E. Wilson. *Sydney, Australasian Med. Publ. Co.*, 1967. 70 pp.

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1451 DISEASES ASSOCIATED WITH PROTEIN LOSING ENTEROPATHY: ELECTRON MICROSCOPIC STUDIES OF THE INTESTINAL MUCOSA. *(E.)* Dobbins, W. O., III (VA Hosp., Durham, N. C.). *Southern Med. J.* 60(10):1077-1081, 1967.

1452 COLONIC FECAL IMPACTION IN A YOUNG DRUG ADDICT. *(E.)* Fetterman, L. E. (Mobile, Ala.). *JAMA* 202(11):1056, 1967.

1453 DIFFUSE (FAMILIAL?) POLYPOSIS OF THE COLON WITH SYMPTOMATIC EXUDATIVE ENTEROPATHY SIMULATING ULCERATIVE COLITIS. *(Hun.)* Varró, V. (Inst. Med. Sci., Szeged, Hungary), G. Baradnay, L. Czernay and E. Sövényi. *Orv. Hetil.* 109(2): 83-86, 1968.

1454 PAPER BEZOAR OF THE DESCENDING COLON. *(E.)* Lewin, I. R. (Pittsburgh, Penna.) and J. R. Miller. *JAMA* 202(2):153-154, 1967.

1455 TRIPLE APPENDIX VERMIFORMIS – A UNIQUE CASE. *(E.)* Tinckler, L. F. (Dept. Surg., U. Singapore). *Brit. J. Surg.* 55(1):79-81, 1968.

1456 PHANTOM RECTUM AFTER COMPLETE RECTAL EXCISION. *(E.)* Farley, D. (Royal North. Hosp., London, England) and I. Smith. *Brit. J. Surg.* 55(1):40, 1968.

1457 CARCINOMA OF THE COLON PRESENTING AS LEFT PERINEPHRIC ABSCESS. *(E.)* Feldman, M. A. (Dudley Rd. Hosp., Birmingham, England), R. E. Cotton and W. M. Gray. *Brit. J. Surg.* 55(1):21-26, 1968.

1458 REGIONAL COLITIS (CROHN'S DISEASE OF THE COLON). *(E.)* Maratka, Z. (Bulovka Hosp., Prague, Czechoslovakia), D. Kubernatova, V. Capek and J. Kudrmann. *Amer. J. Proct.* 19(2):115-129, 1968.

1459 DIVERTICULITIS OF THE APPENDIX. *(E.)* Lenz, T. R. (Pueblo, Colorado). *Rocky Mountai Med. J.* 65(4):31-32, 1968.

1460 AMYLOIDOSIS COMPLICATING GRANULOMATOUS COLITIS. *(E.)* Brownstein, M. H. (Brooklyn, N. Y.). *New York State J. Med.* 68(8):1069-1071, 1968.

1461 THE ROLE OF RADIOTHERAPY IN THE TREATMENT OF INCIPIENT ANAL CANCER (CONCERNING 58 CASES). *(Fr.)* Papillon, J. (Lyon), J. F. Montbarbon, J. L. Chassard, L. Dutou, M. Croisille and G. Alziary De Roquefort. *Arch. Francaises Des Mal. De l'Appar. Digest.* 57(1):57-73, 1968.

1462 A PRELIMINARY EVALUATION OF THE RESULTS OF TREATMENT OF HIRSCHSPRUNG'S DISEASE BY THE DUHAMEL-GROB MODIFICATION OF THE SWENSON PULL-THROUGH OPERATION. *(E.)* Dorman, G. W. (U. Texas Southwestern Med. Sch., Dallas), T. P. Votteler and L. Graivier. *Ann. Surg.* 166(5):783 791, 1967.

1463 PARTIAL INTERMITTENT VOLVULUS OF THE CECUM. *(E.)* Large, A. M. (Wayne State Coll. Med.). *Ann. Surg.* 167(4):609-612, 1967.

See also abstract nos.: 928,936,951,1257

1464 **CATAMNESTIC STUDIES ON THE EFFECT OF STEROID THERAPY ON THE SPREAD OF ULCERATIVE COLITIS.** *(Ger.)* Michel, H. (2nd Med. Clin., Free U. Berlin, Germany) and W. Scholz. *Klin. Wschr.* 45(24): 1250, 1967.

A clinical and radiological review of 87 cases of ulcerative colitis, including 37 (8 men and 29 women) treated with steroids (prednisone or prednisolone; 20-25 mg/day for 3-84 days, average 21 days) and 50 (25 men and 25 women) treated without the use of steroids, demonstrated that steroid therapy tended to limit the disease to the lower segments of the colon and prolonged the period of successful ambulatory care from an average of 1 yr and 9 months to 3 yr and 9 months. Thus, the ulcerative process was limited to the rectum, sigmoid and descending colon in 39% of steroid-treated patients compared to 20% of controls; the entire large intestine was involved in only 43% of steroid-treated patients compared to 63% of controls, and 16.7-18% of both groups showed no radiological signs of ulcerative colitis.

1465 **SERUM PROTEINS AND ENDOTOXINS IN CHRONIC ULCERATIVE COLITIS.** *(E.)* Gilbert, A. P. (Mexican Inst. Social Security, Mexico City, D. F.) and G. Z. Ravelo. *Dis. Colon Rectum* 11(2):124-126, 1968.

Electrophoresis of the serum of 11 patients in an active phase of chronic ulcerative colitis revealed high gamma globulins (17-42%), usually with decreased albumin, in 7 cases; these 7 patients were the more severely affected ones. In groups of rabbits, intradermal injection of epinephrine into the abdominal wall followed by i.v. injection of serum from ulcerative colitis patients caused formation of a necrotic ulcer. Histologic examination revealed necrosis and hemorrhage with characteristics similar to those observed in the Shwartzman and Thomas phenomena. These effects were not obtained when the rabbits were injected i.v. with sera from healthy students or patients with alcoholic cirrhosis (4), myocardial infarction (1), or amebic abscess of the liver (15). From these observations it seems appropriate to conclude that, in the active phases of ulcerative colitis, circulating endotoxins are present.

1466 **ULCERATIVE COLITIS AND INTESTINAL SALMONELLOSIS.** *(E.)* Lindeman, R. J. (U.S. Naval Hosp., Jacksonville, Fla.), L. Weinstein, R. Levitan and J. F. Patterson. *Amer. J. Med. Sci.* 254(6):855-861, 1967.

A review of the 153 patients hospitalized at the New England Medical Center Hospitals for chronic ulcerative colitis between March, 1960 and February, 1965 showed that 7 (4.6%) had positive stool cultures for *Salmonella.* Four of these (males, 10-45 yr old) had a typical clinical picture of granulomatous colitis (one case) or chronic ulcerative colitis complicated by salmonellosis; antibiotic therapy was insufficient to relieve the symptoms and corticosteroids were required. The 3 other cases (2 males, 15-18 yr old, and a 50-yr-old woman) had a more complex and recurrent course in which the precise relationship of ulcerative colitis and salmonellosis remained unclear. During the same period, 5 of 17 patients hospitalized for acute *Salmonella* enteritis showed sigmoidoscopic changes resembling those of early ulcerative colitis. All of these patients (2 men and 3 women, 24-67 yr old) recovered completely either without treatment or after receiving antibiotics. It is suggested that ulcerative colitis may be one of the underlying conditions which predisposes patients to *Salmonella* infections, although it is also possible that an initial salmonellosis may provoke a nonspecific ulcerative colitis.

1467 **MEASUREMENT OF FECAL BLEEDING IN ACTIVE CHRONIC ULCERATIVE COLITIS.** *(E.)* Ormerod, T. P. (Westminster Hosp., London, England). *Amer. J. Dig. Dis.* 12(11):1095-1101, 1967.

Quantitative benzidine tests were performed on the 24-hr feces of 23 patients (8 men and 15 women, 16-77 yr old) with active ulcerative colitis of 0.5-84 months duration, confirmed by sigmoidoscopy and barium enema, and 8 controls free of gastrointestinal disease, hemorrhagic tendencies or congestive heart failure. Blood loss varied from 0.8 to 330 ml/day in the ulcerative colitis patients (4-day mean varying from 1.0 to 89.0 ml/day), but was insufficient to account for the severe anemia seen in some cases (13 of 23 patients had hemoglobin levels below 10.0 g%). In controls, the 4-day mean varied from 1.0 to 2.3 ml/day (highest value 4.3 ml/day). Control studies with radioactive chromium and added blood showed that the benzidine technique is both reliable and accurate.

1468 **THYMECTOMY IN ULCERATIVE COLITIS: A PRELIMINARY REPORT ON A THERAPEUTIC TRIAL IN 7 PATIENTS.** *(Ger.)* Cesnik, H. (Surg. Clin., U. Graz, Austria). *Langenbeck Arch. Klin. Chir.* 321(1):86-98, 1968.

In view of the occurrence of autoimmune reactions in patients with ulcerative colitis, the discovery of histological abnormalities in the thymus in autoimmune diseases, and the known role of the thymus in normal immunological reactions, thymectomy was attempted instead of total colectomy in 7 patients (6 men and 1 woman, 27-59 yr old) with severe, refractory ulcerative colitis of 6 months to 13 yr duration (4-13 yr in 4 of 7). One of these patients had already had a hemicolectomy, and none had responded to conservative therapy. Following thymectomy, 5 of the 7 patients have remained improved or cured (follow-up of 4 weeks to 2 yr), while 2 died of pulmonary embolism about 3 weeks postoperatively despite initial improvement in their colitis. Since the adipose tissue of the excised thymus glands showed nodular thymus residues and lymphatic tissue, it is postulated that thymus abnormalities may play an etiological role in ulcerative colitis. It is acknowledged, however, that the improvement obtained may have been due to coincidence, possible psychological effects, or possible nonspecific effects of thymectomy on the endocrine system.

1469 **ADVERSE REACTIONS TO SALICYLAZOSULFAPYRIDINE (AZULFIDINE) IN THE TREATMENT OF ULCERATIVE COLITIS.** *(E.)* Collins, J. R. (Vanderbilt U. Sch. Med., Nashville, Tenn.). *Southern Med. J.* 61(4):354-358, 1968.

Severe adverse reactions to salicylazopyridine (azulfidine) in 2 male ulcerative colitis patients are discussed. Both patients developed arthralgia, fever, and skin rash after azulfidine treatment with remission when therapy was discontinued. One patient showed signs of acute thyroiditis while taking azulfidine, but whether etiology was based on ulcerative colitis or on the drug therapy remains to be seen. Azulfidine was discontinued, and the patients were placed on steroid and antibiotic therapy. Extensive clinical studies of azulfidine; its affinity for connective tissue, antibacterial action, and lack of absorption; and the rarity of serious adverse reactions are the reasons for the widespread use of azulfidine to treat ulcerative colitis. More remissions have been seen after azulfidine therapy than with any other sulfonamide. However, due to the increasing incidence of adverse reactions, phthalylsulfathiazole or other less toxic sulfonamides should be used until further studies can establish the superiority of azulfidine. If remission with these sulfonamides is unsatisfactory, azulfidine and/or corticosteroids might then be given.

1470 INHIBITION OF *IN VITRO* CYTOTOXICITY OF LYMPHOCYTES FROM PATIENTS WITH ULCERATIVE COLITIS AND GRANULOMATOUS COLITIS FOR ALLOGENEIC COLONIC EPITHELIAL CELLS USING HORSE ANTI-HUMAN THYMUS SERUM. *(E.)*

Shorter, R. G. (Mayo Clinic, Rochester, Minn.), R. J. Spencer, K. A. Huizenga and G. A. Hallenbeck. *Gastroenterology* 54(2):227-231, 1968.

The lymphocytes of 8 ulcerative colitis patients and 4 granulomatous colitis patients were separated from venous blood and found 90% viable (by trypan blue exclusion) in Gib medium in a 1 x 10^6 cells/ml concentration. Colonic epithelial specimens were obtained from colon samples of patients with large bowel carcinomas; 1 x 10^6 cells/ml concentration was 90% viable in Gib medium. Horses were injected twice with approximately 1 x 10^9 human thymocytes for 2 weeks, and bled 1 week after the second injection; anti-human thymus serum was extracted. Normal horse serum was obtained and used in this study. There was no significant difference in the number of viable colonic epithelial cells after 4-hr incubation with lymphocytes from normal subjects that had been previously incubated with normal or immune horse serum or with guinea pig complement. After incubation, lymphocytes from ulcerative colitis and granulomatous colitis patients significantly reduced the number of viable colonic epithelial cells; incubating lymphocytes with normal horse serum before incubating them with colonic epithelial cells did not affect cytotoxicity, whereas incubation with anti-human thymus serum significantly reduced cytotoxicity. When colonic epithelial cells were previously incubated with normal or anti-human thymus serum before incubation with lymphocytes from colitis patients, the destruction of colonic epithelial cells was unaffected by the preliminary incubation.

1471 PANEL DISCUSSION ON ULCERATIVE COLITIS.

(E.) Polish, E. (Hahnemann Med. Coll. Hosp., Philadelphia, Pa.), J. E. Imbriglia, C. M. Thompson and C. C. Wolferth, Jr. *Amer. J. Gastroent.* 49(1):15-38, 1968.

A broad discussion is presented by internists, a pathologist, and a surgeon on various phases of the problem of ulcerative colitis. Among topics covered are the psychosomatic and familial aspects, immunologic factors, early mucosal lesions, surgical approaches, complications of the disease, and medical management. There is still much controversy as to whether ulcerative colitis patients develop more cancer than other segments of the population. The extreme variability of the disease was illustrated by one panelists through the presentation of 10 cases. It is stressed that the management of the patient with toxic megacolon or acute fulminating ulcerative colitis requires careful teamwork. When surgery is necessary, mature ileostomy at the time of initial surgery is favored, and coloproctectomy if it seems advisable in the opinion of the surgery; if it is not, a subtotal colectomy with the establishment of a mucus fistula will often at least temporize and bring the patient through the acute process.

1472 THE INDICATION FOR EMERGENCY COLECTOMY IN ULCERATIVE COLITIS.

(E.) Brooke, B. N. (St. George's Hosp., London, England) and M. Chir. *Dis. Colon Rectum* 11(2):85-90, 1968.

When there is progression from mucosal ulceration with diarrhea to the development of crypt abscesses, the ulcerative colitis patient has begun the acute stage of disease. As the disease becomes acute there is liver damage, often with portal bacteremia. Liver involvement leads to loss of protein into the bowel. Acute diarrhea can rapidly lead to shifts in electrolytes with marked loss of potassium. If the attempt is made to treat the disease before acute dilation has occurred, mucosal islands must be sought for in straight X-ray plates of the abdomen. Operative mortality in a group of 31 who underwent emergency colectomy when the bowel already was disintegrating or dilating was 30%; in a similar-sized group with intact bowel, operative mortality was only 3%.

1473 RECTAL VASCULAR RESISTANCE IN ULCERATIVE COLITIS. *(E.)*

Binder, V. (Gentofte Hosp., Hellerup, Copenhagen, Denmark). *Scand. J. Gastroent.* 3(1):36-42, 1968.

The sigmoidoscope was adapted so that a negative pressure of 200 mm Hg could be transferred to it from a wall suction unit. The number of petechiae appearing after suction for 10 sec was counted, or the number of seconds passing until the visual field was completely covered with blood was recorded Studies were carried out in 77 patients (128 examinations) with ulcerative colitis, in 31 patients with colon or rectum inflammation not due to ulcerative colitis, and in 50 patients without demonstrable colonic lesions. A decreased rectal vascular resistance was almost confined to patients suffering from ulcerative colitis. In most cases the vessel damage was proportional to the degree of inflammation. The exceptions were in particular inactive cases, where 40% of the patients showed a decreased and 60% a normal vascular resistance. The possibility of a pathogenetic difference between those two groups is discussed. A few patients suffering from other inflammatory states of the colon were examined. The rectal vascular resistance was normal in most of the cases, but in a few patients suffering from acute infectious enterocolitis, the bleeding tendency was slightly increased.

1474 A CONTRIBUTION TO THE AUTOPSY DIAGNOSIS OF "CROHN'S DISEASE" OF THE COLON.

(Rev.)(Fr.) Martin, E. D. (Fac. Med., Bichat Hosp., Paris, France) and J. Delarue. *Mem. Acad. Chir.* 94(6/7):217-224, 1968.

1475 **A SIMPLE TECHNIC FOR TREATING CIRCUMILEOSTOMY SKIN ULCERATIONS. [CASE REPORT]** *(E.)* Sommer, R. G. (Hitchcock Clin., Hanover, N. H.) and O. F. Jillson. *Amer. J. Gastroent.* 48(2):135-136, 1967.

1476 **SOME PSYCHOLOGIC CONSIDERATIONS IN THE MEDICAL MANAGEMENT OF ULCERATIVE COLITIS.** *(Rev.)(E.)* Nichols, C. R. (U. Texas Southwest. Med. Sch., Dallas), J. B. Nowlin and M. D. Bogdonoff. *Southern Med. J.* 60(12):1285-1288, 1967.

1477 **SYMPOSIUM: PSYCHIATRIC ASPECTS OF ULCERATIVE COLITIS.** *(E.)* Marder, L. (U. South. California Sch. Med., Los Angeles). *Southern Med. J.* 60(12):1281-1284, 1967.

1478 **TISSUE CULTURE OF THE COLONIC MUCOSA WITH OBSERVATIONS IN ULCERATIVE COLITIS.** *(E.)* Bernik, M. A. (Northwest. U. Med. Sch., Chicago, Ill.), W. L. Donnellan and B. Hirsch. *Gastroenterology* 54(4):588-593, 1968.

1479 **RECENT STUDIES ON INFLAMMATORY INTESTINAL DISEASES IN CZECHOSLOVAKIA.** *(E.)* Maratka, Z. (Prague, Czechoslovakia). *Amer. J. Proct.* 19(2):103-105, 1968.

1480 **COLECTOMY FOR ULCERATIVE COLITIS WITH ILEOSTOMY OR WITH ILEORECTAL ANASTOMOSIS?** *(E.)* Maratka, Z. (Bulovka Hosp., Prague, Czechoslovakia), J. Nedbal, J. Novak, V. Capek and D. Chytilova. *Amer. J. Proct.* 19(2):138-146, 1968.

1481 **ULCERATIVE PROCTOCOLITIS IN CZECHOSLOVAKIA.** *(E.)* Nedbal, J. (Bulovka Hosp., Prague, Czechoslovakia) and Z. Maratka. *Amer. J. Proct.* 19(2):106-114, 1968.

1482 **LIVER DISTURBANCES IN ULCERATIVE COLITIS: EFFECT OF SURGICAL TREATMENT.** *(E.)* Nedbal, J. (Bulovka Hosp., Prague, Czechoslovakia), J. Kudrmann and Z. Maratka. *Amer. J. Proct.* 19(2):130-137, 1968.

See also abstract nos.: 1169,1367

1483 **EXPLORATION OF PANCREATIC EXOCRINE FUNCTION BY CONTINUOUS INFUSION OF SECRETIN.** *(E.)* Pascal, J. P. (Purpan Hosp., Toulouse, France), N. Sannou and A. Ribet. *Amer. J. Dig. Dis.* 13(3): 213-221, 1968.

Forty-seven fasted control, chronic alcoholic pancreatitis with calcifications, acute alcoholic pancreatitis without cholelithiasis, hyperlipemia without pancreatitis, cholelithiasis and peptic ulcer patients were used to determine the advantages of secretin infusion and pancreozymin injection in diagnosing pancreatic exocrine insufficiency. Maximum bicarbonate secretion was produced with 3 U/kg/hr secretin infusion; there were no side-effects at doses up to 5 U/kg/hr. Bicarbonate output is the most useful parameter in measuring pancreatic activity after pancreozymin. Continuous secretin infusion can distinguish chronic pancreatitis patients from controls, but not from other organic gastrointestinal disease patients. More tests are needed to establish statistical limits for the results of various disease states.

1484 **SYMPOSIUM ON DISEASES OF THE PANCREAS: PHYSIOLOGY OF THE PANCREAS.** *(E.)* Nielsen, O. F. (Binghamton, N. Y.). *Amer. J. Gastroent.* 49(2):109-111, 1968.

Exocrine pancreatic function with regard to secretin and pancreozymin stimulation; bicarbonate, amylase, trypsin, chymotrysin, and lipase secretion; and nervous control are presented. A polypeptide trypsin inhibitor is found in pancreatic juice and extracts which protects the pancreas from trypsin digestion. Lipase deficiency is the first detectable sign of pancreatic disease. The manifestations of chronic pancreatitis are its complications. Early chronic pancreatitis diagnosis permits early treatment and alters the disease's progression and obviates many surgical procedures.

1485 **GASTRIC SECRETION IN ULCEROGENIC TUMORS OF THE PANCREAS.** *(E.)* Ruppert, R. D. (Ohio State U. Hosp., Columbus), N. J. Greenberger, F. M. Beman and F. M. McCullough. *Ann. Intern. Med.* 67(4): 808-815, 1968.

Basal acid output, histamine-stimulated acid output, 12-hr overnight acid secretion, and basal/stimulated acid secretion ratio were determined in gastric secretions of 5 Zollinger-Ellison syndrome patients and 300 duodenal and gastric ulcer and control patients using the augmented histamine test. The 4 parameters were not uniformly abnormal in the 5 cases. Basal acid output was markedly elevated with only a minimal increase after histamine stimulation; basal/stimulated acid concentration was greater than 0.6 in all 5 patients and less than 0.6 in the 300 other patients. A decrease in basal and stimulated volumes, and acid concentrations and outputs to normal levels was seen after excision of an adenoma in 1 patient. High basal acid concentrations and elevated basal/stimulated acid ratios may be important diagnostic determinants of ulcerogenic pancreatic tumors.

1486 **pH AND CONCENTRATION OF PANCREATIC ENZYMES IN ASPIRATES FROM THE HUMAN DUODENUM DURING DIGESTION OF A STANDARD MEAL IN PATIENTS WITH PANCREATIC DISEASES.** *(E.)* Worning, H. (Rigshospitalet, Copenhagen, Denmark), S. Mullertz, E. Hess Thaysen and H. O. Bang. *Scand. J. Gastroent.* 3(10):83-90, 1968.

The secretory volume, pH, and pancreatic enzyme concentrations were determined in duodenal aspirates of 58 chronic pancreatitis and pancreatic carcinoma patients at 20 min intervals during the digestion of a standard meal. The mean aspirate pH in both groups was not significantly different from that of normal subjects; variations in secretion of different enzymes were analogous. Enzyme concentrations were below normal in all tests except lipase for chronic pancreatitis patients; enzyme concentrations were normal in pancreatic cancer patients. The standard meal test is valuable in the diagnosis of chronic pancreatitis, not pancreatic carcinoma.

1487 **HISTOCHEMICAL ANALYSIS OF SECRETORY MATERIAL IN A ZOLLINGER-ELLISON TUMOUR.** *(E.)* Rieken, E. O. (Med. Clin., U. Marburg/Lahn, Germany), H. Goebell and H. A. Schmidt. *Scand. J. Gastroent.* 3(1):95-98, 1968.

Histological, histochemical, biochemical, and pharmacological analyses were made of tissue specimens from tumors removed from Zollinger-Ellison syndrome patients. Morphologically the tumors were composed of typical cords and groups of polygonal nuclei and an eosinophilic granular cytoplasm, connective tissue ribbons with very few cells, and round or oval globules between the epithelial cells and sometimes in close contact with the capillary system. The extracellular component was gastrin-like when analyzed; it was a neutral mucopolysaccharide-protein complex which penetrates the capillaries and smaller vessels to reach the bloodstream. A secretory material with endocrine qualities is produced by the tumor epithelial cells. Further study is needed to decide whether the globules found are lysosomes (due to the presence of lysosomal enzymes) or simply represent secretory material with hydrolytic activity.

1488 **THE EARLY DIAGNOSIS OF CARCINOMA OF THE PANCREAS.** *(Ger.)* Körbler, J. (Gajeva 35, Zagreb, Yugoslavia). *Krebsarzt* 23(1):32-36, 1968.

Based on personal experience (3 cases presented) and a review of the literature (27 refs.), the author suggests that ischialgia may be a useful early symptom of pancreatic cancer, preceding biochemical or radiological signs of many years. In the 3 personal cases (2 men and 1 woman, 51-56 yr old), constant back pain had been present for 2, 8 and 20 yr, resp., before diagnosis and treatment. It is also pointed out that radiotherapy (^{60}Co) has so far been the only effective palliative therapy for pancreatic cancer, and the hope is expressed that ^{60}Co might be a curative measure if used earlier in the disease. Five cases with inoperable pancreatic carcinoma are presented briefly in whom gamma-irradiation produced marked, even if temporary, improvement.

1489 **THE TWENTY-FOUR HOUR EXCRETION OF AMYLASE AND LIPASE IN THE URINE: CORRELATION WITH FUNCTIONAL STATE AND OPERATIVE INJURY OF THE PANCREAS.** *(E.)* Ambromovage, A. M.

(Hahnemann Med. Coll., Philadelphia, Pa.), J. M. Howard and F. W. Pairent. *Ann. Surg.* 167(4):539-546, 1968.

In a comparison study of enzyme levels and pancreatic function, serum and 24-hr urine amylase and lipase levels were measured in 106 normal subjects, 26 patients free of pancreatic disease, and 23 patients who had undergone pancreatic surgery. The measurements were made before, immediately after, and 2 or 3 days after surgery in nonpancreatic and pancreatic disease patients. Serum and urinary amylase levels were similar in the normal subjects and preoperative nonpancreatic disease patients; urinary lipase excretion in both groups varied from day to day in the same individual. No appreciable changes were seen in enzyme levels immediately after surgery or in the stable postoperative period. Urinary lipase and serum amylase levels rose, and serum lipase and urinary amylase levels fell, in pancreatic carcinoma; all levels fell in the stable postoperative period. Transient elevations in serum and urinary amylase and serum lipase followed surgery in chronic pancreatitis patients. Preoperative enzyme levels were high or in the upper normal range in relapsing pancreatitis; these levels remained high following surgery. Serum and urinary amylase and serum lipase increased markedly in the immediate postoperative period after pancreatography and in mild pancreatitis. Pancreatic pseudocyst patients had elevated serum and urinary amylase and serum lipase levels with low urinary lipase excretion; all elevated levels, after a transient increase in the immediate postoperative period, returned to normal in the stable postoperative period. Quantitative data on urinary lipase excretion have not proved a reliable index of pancreatic injury or healing. The increase in amylase excretion after pancreatography is directly related to pancreas function, but not to the severity of injury.

1490 **DISRUPTION OF THE HEAD OF THE PANCREAS CAUSED BY BLUNT TRAUMA IN CHILDREN: A REPORT OF TWO CASES TREATED WITH PRIMARY REPAIR OF THE PANCREATIC DUCT.** *(E.)* Martin, L. W. (U. Cincinnati Coll. Med., Ohio), B. M. Henderson and N. Welsh. *Surgery* 63(4):697-700, 1968.

The case histories of 2 children who experienced pancreas and pancreatic duct transection following traumatic accidents are described. Surgical repair of the duct of Wirsung and pancreas tissue suture were successful in both cases and are recommended as the most efficient methods of managing selected cases of pancreas and pancreatic duct transection.

1491 **THE DIAGNOSIS OF PANCREATIC DISEASE.** *(E.)* Bishop, R. P. (St. Albans, New York). *Amer. J. Gastroent.* 49(2):112-119, 1968.

Serum lipase, amylase, calcium, and glutamic oxaloacetic transaminase determinations are valuable aids in diagnosing acute, edematous, and hemorrhagic pancreatitis. Edematous and hemorrhagic pancreatitis can be differentiated by serum desoxyribonuclease 1 (DNase 1) levels, normal in edematous and elevated in hemorrhagic pancreatitis; this procedure is impractical because it is long, expensive, and cannot diagnose edematous pancreatitis. Methemalbumin is present in the serum of hemorrhagic pancreatitis patients but not in others; this determination is simple and more reliable in differentiating edematous and hemorrhagic pancreatitis. Chronic pancreatitis may develop without symptoms; it may not be diagnosed before steatorrhea, diabetes, or pancreatic calcifications develop. Fecal fat levels and the secretin test are good determinants of pancreatic exocrine insufficiency. Early diagnosis of pancreas carcinoma is difficult. Pancreatic exfoliative cytology, pneumoperitoneum, barium meal examination, splenoportography, percutaneous transhepatic cholangiography, and selective celiac and mesenteric arteriography may detect anatomical abnormalities and/or displacements characteristic of pancreas carcinoma. Glucose tolerance tests, leucine aminopeptidase levels, and tolbutamide tests may be used to diagnose pancreatic carcinoma, but the results can indicate other pancreatic conditions and some nonmalignant hepatobiliary diseases. Diagnostic test selection must be individualized for various pancreatic diseases, and diagnostic accuracy and applicability must be kept in mind.

1492 **RESPONSE TO SECRETIN IN MAN.** *(E.)* Wormsley, K. G. (Royal Infirmary, Manchester, England). *Gastroenterology* 54(2):197-209, 1968.

Eight normal subjects, 12 duodenal ulcer patients, 4 recovered acute pancreatitis patients, 6 chronic calcific pancreatitis patients, 4 cholelithiasis patients and 10 patients with miscellaneous gastrointestinal disorders were used to study the effects of single injections (2 U/kg), constant infusion (10 or 25 U/kg/hr), or both, of i.v. secretin on pancreatic bicarbonate secretion and other electrolytes in gastric and duodenal aspirates after a 10-hr fast. The bicarbonate response to rapidly injected secretion was less than that to 10 U/kg/hr infusion which elicited maximal bicarbonate output in 20 out of 24 patients. The maximum bicarbonate response to infused secretin was similar in normal, duodenal ulcer and cholelithiasis patients, while that of chronic calcific pancreatitis patients was markedly impaired. Duodenal aspirate volume was inversely proportional to bicarbonate concentration and directly proportional to chloride concentration. In chronic calcific pancreatitis, the duodenal aspirate bicarbonate concentration was significantly lower than normal at all duodenal flow rates. It is concluded that maximal bicarbonate response to continuous secretin infusion and the relationship of bicarbonate concentration to duodenal aspirate volume can be used as indices of bicarbonate secretory capacity.

1493 **THE LATE INTESTINAL AND HEPATIC COMPLICATIONS OF FIBROCYSTIC DISEASE OF THE PANCREAS (MUCOVISCIDOSIS).** *(E.)* Sorrell, V. F. (Princess Mary Hosp. Children, Auckland, New Zealand) and D. M. O. Becroft. *Aust. New Zeal. J. Surg.* 37(3):217-222, 1968.

The pathogenesis, prevention and treatment of late intestinal and hepatic complications in cystic fibrosis are discussed on the basis of two personal cases (males, 10-20 yr old) and a review of the literature (18 refs.). Both patients described presented with a palpable mass in the right iliac fossa, due apparently to the accumulation of inspissated secretions adherent to the cecal mucosa; the younger patient also had multilobular biliary cirrhosis with a strikingly nodular liver. Right hemicolectomy was performed in this patient, due to the suspicion of malignancy, while in the second the palpable mass disappeared with conservative treatment (pancreatic extract and daily colonic washouts). Other intestinal complications derived from a review of the literature include intestinal obstruction (with or without a palpable mass), intussusception, volvulus and acute appendicitis. Microscopic liver lesions are common, but clinical liver disease is a rare complication. Infection may play a role in aggravating and causing the spread of the focal obstructive lesions.

1494 PANCREATIC INSUFFICIENCY AS THE PRESENTING FEATURE OF HYPERPARATHYROIDISM. [CASE REPORT] *(E.)* Warshaw, A. L. (Natl. Inst. Arth. Metab. Dis., NIH, Bethesda, Md.), W. D. Heizer and L. Laster. *Ann. Int. Med.* 68(1):161-167, 1968.

1495 ORAL ADMINISTRATION OF N-ACETYL CYSTEINE IN THE PROPHYLAXIS OF "MECONIUM ILEUS EQUIVALENT". *(E.)* Lillibridge, C. B. (U. Washington Sch. Med., Seattle), J. M. Docter and S. Eidelman. *J. Pediat.* 71(6):887-889, 1967.

1496 HEMORRHAGE IN PANCREATIC PSEUDOCYSTS: REVIEW OF LITERATURE AND REPORT OF TWO CASES. *(E.)* Cogbill, C. L. (VA Hosp., Dayton, Ohio). *Ann. Surg.* 167(1):112-115, 1968.

1497 MUCOVISCIDOSIS. *(Fr.)* Megerand, A. (Geneva, Switzerland). *Med. et Hyg.* 26(815):248-251, 1968.

1498 PLEURAL EFFUSION WITH ELEVATED AMYLASE ACTIVITY AND PANCREATIC CARCINOMA. [CASE REPORT] *(Fr.)* Siguier, F. (Cochin Hosp., Paris, France), P. Godeau, G. Herreman, R. Kalifat and G. Delluc. *Bull. Mem. Soc. Med. Hop. Paris* 118(14):1287-1298, 1967.

1499 A REVIEW OF THE SYMPTOMS OF PANCREATIC DISEASES. *(Ger.)* Müller-Wieland, K. (1st Med. Clin., U. Hamburg, Germany). *Deut. Med. Wschr.* 93(9):391-394, 1968.

1500 EFFECT OF CHLOROQUINE ON MORPHOLOGY OF LEUKOCYTES AND PANCREATIC EXOCRINE CELLS FROM THE RAT. *(E.)* Fedorko, M. E. (Rockefeller U., New York City). *Lab. Invest.* 18(1):27-37, 1968.

1501 SOME PROBLEMS OF DIAGNOSIS AND SURGICAL TREATMENT OF MALIGNANT TUMORS OF THE HEAD OF THE PANCREAS AND LARGE DUODENAL PAPILLA. *(Rus.)* Datsenko, V. S. (S. P. Botkin Clin. Hosp., Moscow). *Khirurgiia (Moskva)* 44(1):44-49, 1968.

1502 THE TECHNIQUE OF PANCREATOGASTROSTOMY IN CLINICAL PRACTICE AND EXPERIMENT. *(Rus.)* Makokha, N. S. (M. I. Kalinin Omsk Med. Inst., USSR) and S. A. Nikitchenko. *Khirurgiia (Moskva)* 44(1):55-60, 1968.

1503 TRANSCUTANEOUS INTRAHEPATIC CHOLANGIOGRAPHY IN TUMORS OF PANCREATODUODENAL REGION. *(Rus.)* Tishchenko, N. A. (Sci. Res. Inst. Radiol. Min. Health BSSR, Minsk, USSR), G. D. Golub and L. S. Sukovatykh. *Khirurgiia (Moskva)* 44(1):49-55, 1968.

1504 SARCOMA OF THE PANCREAS. [CASE REPORT] *(Fr.)* Chevrel, B. (St. Antoine Hosp., Paris, France). *Ann. Chir.* 22(3/4):199-203, 1968.

1505 PROBLEMS POSED BY TRANSPLANTATION OF THE PANCREAS. *(Rev.)(Fr.)* Moulle, P. *Presse Med.* 75(55):2833-2838, 1967.

1506 EXOCRINE PANCREATIC FUNCTIONS IN THE AGED. *(E.)* Fikry, M. E. (Alexandria U., Egypt). *J. Amer. Geriat. Soc.* 16(4):463-467, 1968.

1507 HYPOGLYCEMIC ADENOMA OF THE PANCREAS. DIAGNOSIS AND THERAPEUTICAL INDICATIONS, WITH THREE CASE REPORTS. *(Fr.)* Dossa, J. (Montpellier) and J. Mirouze. *Ann. Chir.* 22(5-6):381-389, 1968.

1508 CYSTADENOMA AND CYSTADENOCARCINOM OF THE PANCREAS. *(Heb.)* Teva, Z., J. Horvitz and M. Horvitz. *Harefuah* 73(10):341-344, 1967.

See also abstract nos.: 930,1022

1509 **TRASYLOL IN THE TREATMENT OF PANCREATITIS.** *(Ger.)* Grözinger, K. H. (Surg. Clin., U. Heidelberg, Germany). *Med. Welt* (8):473-477, 1968.

On the basis of a detailed review of the literature, including reports of double-blind and large-scale human studies as well as animal experiments, immediate Trasylol therapy at high dosage is urgently recommended in all cases of acute pancreatitis, even before verification of the diagnosis. The optimal dosage is 500,000-1,000,000 kallikrein-inhibitor U by slow i.v. infusion, repeated daily for 5-7 days. This apparently reduces the mortality in acute pancreatitis to about 10%. Chronic pancreatitis, however, is not amenable to enzyme-inhibitor therapy, except during acute exacerbations. The prophylactic use of Trasylol during gastrointestinal or biliary surgery is limited by expense, but is recommended in cases where the pancreas has been manipulated. A brief review of the etiology and pathophysiology of acute pancreatitis is appended. 53 refs.

1510 **CHRONIC PANCREATITIS.** *(Sp.)* Bonafonte Fernandez, M. (Santa Cruz y San Pablo Hosp., Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 27(1):49-80, 1968.

The definition, etiology, pathophysiology, diagnosis, and medical and surgical treatment of chronic pancreatitis are reviewed on the basis of the literature and experience with 81 cases (18 males and 63 females) treated in recent yr; this group included 40 with recurrent canalicular pancreatitis, 21 with stenosing pancreatitis, 10 with nodular cephalic pancreatitis, 5 with necrotic pancreatitis, and 5 with pseudocysts of the pancreas. Although many factors can play a role in the etiology of chronic pancreatitis (infection, chemical toxins such as alcohol, allergy, metabolic disorders, gastroduodenal ulcer, diverticulosis, trauma), the 81 cases discussed included only primary sclerotic pancreatitis (10 males and 13 females; nodular, annular or peripheral) and biliary pancreatitis (58 cases, caused by blockage or hypertension of the Wirsung duct, stenosis of the sphincter of Oddi, cholecystitis, or stones in the common bile duct or gallbladder). Proper diagnosis depends on clinical and laboratory findings, as well as on radiology, biopsy and exploratory surgery; pancreatography was carried out without incident in 41 of the 81 cases, and the pancreatographic findings in chronic pancreatitis are briefly reviewed. The medical treatment of pancreatitis is largely symptomatic and supportive, based on limiting pancreatic secretion, alleviating pain, and compensating for pancreatic insufficiency. The principal causative therapy is surgical, varying from correction of the underlying biliary lesions to pancreaticojejunostomy, pancreaticogastrostomy or even total pancreatectomy. Most of the 81 cases discussed benefited from operations such as transduodenal papillotomy (44 cases), biliodigestive anastomosis (13 cases), simple cholecystectomy (12 cases), externalization of the bile duct (7 cases), or operations on the pancreas itself (10 cases).

1511 **SURGICAL ASPECTS OF PANCREATIC ABSCESS.** *(E.)* Steedman, R. A. (U. California Coll. Med., Irvine), R. Doering and R. Carter. *Surg. Gynec. Obstet.* 125(4):757-762, 1967.

Thirteen patients with pancreatic abscess had an overall mortality rate of 46%. Acute pancreatitis preceded abscess formation in all patients. Chronic alcoholism and biliary disease were the most common predisposing factors, with carcinoma being responsible in 1 patient. An average interval of 4 weeks elapsed between the onset of pancreatitis and signs of abscess formation. The diagnosis was frequently suggested by a tender mass in conjunction with weight loss and fever. Abscess location was established in two-thirds of the patients by basic roentgen studies. Adjunctive laboratory findings demonstrated anemia, hypoalbuminemia, hyperglycemia, and an elevation of alkaline phosphatase. Diarrhea, gastrointestinal bleeding, and respiratory distress may be key features in impending fistulization and thoracic abscess extension. Failure of recognition or delay in adequate drainage inevitably leads to dissection into extra-abdominal cavities, erosion into adjacent structures, intraperitoneal perforation, and often death. Septicemia was the single, most frequent cause of death. Survival in the presence of this disease depends upon prompt diagnosis, adequate surgical drainage, specific antibiotics, and appropriate i.v. colloids.

1512 **PRIMARY PARATHYROID HYPERPLASIA ASSOCIATED WITH ACUTE HEMORRHAGIC PANCREATITIS: REPORT OF A CASE AND A BRIEF REVIEW OF THE LITERATURE.** *(E.)* Sahebjami, H. (Dept. Med., Washington Hosp. Ctr., D. C.). *Southern Med. J.* 61(3): 262-264, 1968.

A case is presented of a 40-yr-old man with a history of heavy drinking who was admitted because of acute abdominal pain, nausea, and vomiting. In recent years he had experienced mild intermittent abdominal pain with constipation. His blood calcium level was normal. Autopsy revealed severe hemorrhagic pancreatitis. The only other abnormality was hyperplasia of two of the parathyroid glands. This association is now regarded as a definite clinical entity. In the presence of normal serum calcium levels, possible parathyroid hyperplasia should be considered. In such cases, removal of the abnormal parathyroid tissues may be the only way to prevent recurrent attacks of pancreatitis, and should precede any considerations of pancreatic surgery, except in emergencies.

1513 **THE ULTRASTRUCTURE OF THE PANCREAS IN 8 CASES OF CHRONIC PANCREATITIS.** *(Fr.)* Tasso, F. (Fac. Med., Marseille, France). *Ann. Anat. Path.* 12(4):343-372, 1967.

Electron microscopy of pancreatic tissue taken from 8 patients (males, 28-60 yr old) with chronic pancreatitis (7 with calcifying pancreatitis and 1 with cancer of the head of the pancreas) revealed very inconsistent and irregular changes in ultrastructure, varying not only from patient to patient but from section to section. In addition to severe degenerative lesions, sclerosis, and some general modifications in the glandular architecture, the principal abnormalities were seen in the endoplasmic reticulum, hypertrophy and distension of the cisternae in the Golgi apparatus, irregular quantitative changes in the secretory granules (decreased numbers of zymogen granules with or without an increase in prozymogen granules), minor changes in the mitochondria, and numerous polymorphic inclusions. These inclusions are felt to indicate an accumulation of phospholipids, due both to overproduction and decreased catabolism. The changes in the centro-acinar and duct cells were more discrete, consisting mostly of inclusions and abnormalities in the Golgi apparatus. However, an unusual cell type was noted which was particularly rich in mitochondria. The nature and significance of this cell type remain unexplained.

1514 THE THEORY AND CLINICAL PRACTICE OF ACUTE DISEASES OF THE PANCREAS. PART II. THE DIAGNOSIS AND TREATMENT OF ACUTE PANCREATITIS. *(Ger.)* Gay, B. (Surg. Clin., Martin-Luther U., Halle-Wittenberg, Germany). *Zbl. Chir.* 93(8):297-306, 1968.

Among 81 patients (39 males and 42 females, average age 55.8 yr, most 41-70 yr old) treated for acute pancreatitis during the period 1956-66, 63 also had cholelithiasis, 1 had been misdiagnosed as "acute abdomen" due to gallstone ileus, and 4 had been misdiagnosed as perforation of the stomach. Although surgery on the pancreas itself was not attempted in these cases, the sequellae of acute pancreatitis were detected in 28 of the 43 patients who eventually received biliary surgery. The principal symptoms were those of "acute abdomen" in general (upper abdominal pain, tachycardia, fever, leukocytosis, jaundice, accelerated erythrocyte sedimentation rate, cardiovascular collapse, and urinary abnormalities). Although the serum amylase was elevated (maximum 8192 Wohlgemuth U) in only 20 of the 81 cases, the urinary amylase was elevated (maximum 16,384 U) in 48; however, there was no relation between urinary amylase and disease severity. Hypocalcemia was detected in only 11 out of 48 cases tested. Although Trasylol therapy seemed to have no effect on mortality (death in 11 of 47 treated with Trasylol and 10 of 34 treated without it), this agent is recommended for its favorable effect on shock and pain; also, patients treated with Trasylol could be operated on (biliary surgery) after only 2-3 weeks compared to the usual waiting period of 2-3 months. Since the primary purpose of treatment is to combat shock and pain and prevent autodigestion, immediate administration of atropine (0.5 mg every 6 hr), 5% glucose, blood transfusions, electrolytes, antibiotics, cardiac stimulants, spasmolytic agents, and Trasylol (500,000-1,000,000 U) is recommended, along with gastric suction. No food or water should be given for the first 5 days, and even after two weeks, the diet should be kept absolutely fat-free. Even so, the mortality remains high, justifying the attempts to operate during the acute stage in some cases. The principal emphasis in the extensive review accompanying this report (70 refs.) is on the differential diagnosis of acute pancreatitis, particularly from perforation of the stomach and myocardial infarction. Although there are no specific laboratory tests, it is felt that an accurate clinical diagnosis can be made if all the symptoms are taken into consideration. Determinations of the serum glutamic-pyruvic transaminase, leucine aminopeptidase, and antithrombin III are also mentioned as promising possibilities for differential diagnosis.

1515 SPLENOPORTOGRAPHIC CHANGES IN CHRONIC PANCREATITIS. *(E.)* Rignault, D. (Military Hosp., Du Val de Grace, France), J. Mine and D. Moine. *Surgery* 63(4):571-575, 1968.

Splenoportographic changes were studied in 20 male patients with clinically and radiologically confirmed chronic pancreatitis due to alcoholism. Alteration in the shape, course, location, and filling of the splenoportal trunk were noted in 6 patients; partial obstruction and variable impairment of splenoportal axis emptying were observed in 5 patients. Complete splenic vein obstruction due to compression and thrombosis was seen in 6 patients; 2 more exhibited collateral channel displacement as well. Splenic vein obstruction, collateral displacement, portal vein thrombosis, and esophageal varices were observed in 1 patient. When a chronic pancreatitis patient is scheduled for surgery, splenoportographic indication of splenic obstruction may affect the choice of operative procedure to be used.

1516 COMPLICATIONS OF ACUTE PANCREATITIS. *(E.)* Lukash, W. M. (Natl. Naval Med. Ctr., Bethesda, Maryland). *Amer. J. Gastroent.* 49(2):120-125, 1968.

One or more complications occurred in 38 out of 100 acute pancreatitis patients; primary etiological factors were alcoholism, biliary tract disease, peptic ulcer, mumps, and surgery. Local peripancreatic lesions, remote organ effects produced by pancreatic enzymes, and metabolic, endocrine, psychiatric, and hematological problems occur in acute pancreatitis; pulmonary complications have also been observed. Acute pancreatitis has a 5% mortality rate. Diagnosis and management can be facilitated by the clinician's awareness of the diverse manifestations and complications of the disease.

1517 PHOSPHOLIPIDS, ACUTE PANCREATITIS, AND THE LUNGS: EFFECT OF LECITHINASE INFUSION ON PULMONARY SURFACE ACTIVITY IN DOGS. *(E.)* Morgan, A. P. (Harvard U. Med. Sch., Boston, Mass.), M. E. Jenny and H. Haessler. *Ann. Surg.* 167(3):329-335, 1968.

1518 SMALL INTESTINAL INFARCTION AS A COMPLICATION OF PANCREATITIS. [TWO CASES] *(E.)* Collins, J. J., Jr. (Harvard U. Med. Sch., Boston, Mass.), L. M. Peterson and R. E. Wilson. *Ann. Surg.* 167(3):433-436, 1968.

1519 RECENT PROGRESS IN OUR UNDERSTANDING OF ACUTE PANCREATITIS. *(Rev.)(Fr.)* Leger, L. (Necker Hosp., Paris, France), J. Caroli, C. Debray, M. Gaultier and J. Hamburger. *Presse Med.* 76(13):625-628, 1968.

1520 PANCREATITIS: SYMPOSIUM, MARSEILLES, 1963. *(E.)* Sarles, H. (Marseilles, France) [Ed.] Basel, S. Karger, 1965. 228 pp.

1521 INVESTIGATIONS OF HYPOCALCEMIA IN ACUTE PANCREATITIS. *(Pol.)* Bernacki, E. (Acad. Med., Bialystok, Poland). *Roczn. Acad. Med. Marchlewski* (Suppl.) 18:1-76, 1967.

1522 EXPERIMENTAL RESULTS WITH THE ENZYME INHIBITOR TRASYLOL IN ACUTE PANCREATITIS. *(Ger.)* Grozinger, K. H. (Surg. Clin., U. Heidelberg, Germany). *Fortschr. Med.* 86(7):281-283, 1968.

1523 THE THEORY AND CLINICAL PRACTICE OF ACUTE DISEASES OF THE PANCREAS. PART I. THE PATHOGENESIS OF ACUTE PANCREATIC

ECROSIS. *(Ger.)* Gay, B. (Surg. Clin., Martin-Luther U., alle-Wittenberg, Germany). *Zbl. Chir.* 93(5):189-195, 1968.

524 **PANCREATITIS.** *(Rev.)(E.)* Fleming, L. B. (Dept. Surg., U. Newcastle upon Tyne, England). *rit. Med. J.* 1(5595):813-815, 1968.

525 **ACUTE PANCREATITIS AND HYPERLIPAEMIA. [TRANSLATION OF DEUTSCH. MED. WSCHR. 93:492, 1968.]** *(E.)* Braunsteiner, H. (Dept. Med., U. Innsbruck, Austria). *German Med. Monthly* 13(3):142-143, 1968.

1526 **ON FIVE CASES OF CEPHALIC PANCREATODUODENECTOMY IN CHRONIC PANCREATITIS.** *(Fr.)* Mouchet, A. (Suresnes-Paris), J. Marquand, M. Guivarc'h and F. Adle. *Ann. Chir.* 22(5-6):375-379, 1968.

See also abstract nos.: 949,1492,1661

LIVER AND BILIARY TRACT
GENERAL

1527 **SOLITARY HEPATIC CYST: CASE REPORTS.** *(E.)* Sanders, D. M., II (Vet. Admin. Hosp., Birmingham, Ala.) and J. M. Garret. *Southern Med. J.* 61(3): 256-261, 1968.

Two cases are presented of 2 men (ages 68 and 85 yr) with large, solitary hepatic cysts that had presented only minimal symptoms for many yr in each case. One was admitted to the hospital because of an episode of acute, pleuritic pain, the other because of obstructive symptoms in the lower urinary tract and mild congestive failure. Both responded to conservative treatment. After review of some series in the literature, it is suggested that more attention should be drawn to conservative management in uncomplicated cases since the operative mortality varies from 9.4-22%.

1528 **REVERSE SPLENOCAVAL ANASTOMOSIS FOR PREVENTION OF POSTSHUNT AMMONIA INTOXICATION.** *(E.)* Davidson, F. (Div. Med. Surg., Montefiore Hosp., New York City), A. Denize, E. S. Hurwitt and H. Laufman. *Surg. Gynec. Obstet.* 125(4):815-818, 1967.

Blood ammonia levels were determined in 8 dogs with the conventional portacaval anastomosis and 8 with reverse splenocaval anastomosis. Reverse splenocaval anastomosis was performed by dividing the splenic vein at its insertion into the portal vein and anastomosing the proximal end of the distal segment end-to-side to the inferior vena cava. Fasting arterial blood ammonia levels after reverse splenocaval shunt were within normal limits, whereas portacaval shunt resulted in an average determination about twice that of normal. Six hr ammonia tolerance tests after oral blood feedings showed essentially no rise, in contrast to the marked elevations in dogs with portacaval shunts.

1529 **RADIOISOTOPE SCANNING OF LIVER AND SPLEEN IN UPPER ABDOMINAL TRAUMA.** *(E.)* Little, J. M. (Royal Prince Alfred Hosp., Sydney, Australia), J. McRae, N. Smitananda and J. G. Morris. *Surg. Gynec. Obstet.* 125(4):725-729, 1967.

Liver scans, using 100 μC of colloidal ^{198}Au i.v., were made in 12 patients in all but one of whom there was obtained a clear history of abdominal trauma, although the symptomatology was difficult to evaluate. The liver scans detected lesions 3-5 cm in diameter that interfered with isotope uptake as seen in 4 of the patients. However, the greatest value derived from the accurate depiction of the size, position and outline of the liver itself. In 4 patients the liver scans revealed no clear-cut abnormaltiy; while the procedure cannot definitely establish the absence of liver damage, the uncomplicated clinical courses virtually excluded significant liver trauma. While liver scanning cannot replace careful clinical appraisal of suspected liver trauma, it can provide information which is not available with current roentgenologic techniques.

1530 **SERUM TRANSFERRIN IN HEMOCHROMATOSIS, HEPATIC CIRRHOSIS, AND ACUTE VIRAL HEPATITIS.** *(It.)* Dobrilla, G. (Inst. Spec. Med. Path., U. Padua, Italy), L. A. Scuro, A. Innecco, V. Lo Cascio and O. Bosello. *Policlinico (Med)* 74(6):295-312, 1967.

The average serum transferrin (siderophilin) level as determined by the radial immunodiffusion method of Fahey & McKelvey was found to be 163 mg% in 11 cases of hemochromatosis (8 primary and 3 secondary to liver disease), 205 mg% in 19 case of hepatic cirrhosis, 105 mg% in 11 cases of viral hepatitis, anc 287 mg% in 20 controls. Low transferrin levels (185-195 mg% were also observed in 4 apparently normal relatives of a patien with hemochromatosis. When the serum total iron-binding capacity was compared with the amount of iron theoretically bindable to the immunologically determined transferrin levels, the two values were found to be comparable in controls (351 and 358 μg%, resp.). In all three groups of patients with low transferrin levels, however, the total iron-binding capacity (280 303 μg%) was higher than the iron theoretically bindable by tl transferrin (188-257 μg%), indicating that the blood of such pa tients contains iron in the free form or bound to proteins othe than transferrin. It is also concluded that a genetic factor, in addition to liver dysfunction, must play a role in the hypotran ferrinemia of patients with primary hemochromatosis.

1531 **HEPATIC RESECTION.** *(It.)* Benedetti Valenti S. *Chir. Gastroent.* 1(3):409-417, 1967.

Following a brief aside on surgical terminology and the region anatomy of the liver, the principal indications for hepatic resection are given as primary carcinoma of the liver, with or without cirrhosis and with or without invasion of adjacent organs, metastasis to the liver, carcinoid of the liver, cancer of the gallbladder, benign tumors of the liver, echinococcosis, intrahepatic lithiasis, angiocolitis due to *Ascaris* in children, hep tic trauma, hemobilia, and cirrhosis. Brief attention is also given to contraindications (hepatic resection is absolutely contraindicated only by so-called “acute cancer”), diagnostic tech niques which can be used to determine the extent of the lesio preoperative and post-operative treatment, hepatic regeneratio surgical mortality, and post-operative survival time. The most important special problem in hepatic resection is the prevention of hemorrhage, which can be facilitated by clamping of the hepatic peduncle, creation of a bloodless field by means o liver by-pass, or digitoclasis.

1532 **TECHNIQUE OF HEPATIC RESECTION.** *(It.)* Grassi, G. and S. Benedetti Valentini. *Chir. Gastroent.* 1(4):517-533, 1967.

The subjects covered in this detailed review of hepatic surgica technique include the vascular anatomy of the liver and biliar tract, the approach (right thoracophrenolaparotomy or a left abdominal incision), control of possible hemorrhage, the maxi mal possible extent of hepatic resection (usually 60-70% although 90% has been reported), drainage of the bile ducts in hepatectomy (simple, intermediate or extended), sectoriectom or segmentectomy, suprahepatic excision, mixed hepatectomy partial clamping of the hepatic peduncle, digitoclasis, and Bur geon’s technique for cancer of the liver. Many illustrations ar provided, taken mostly from the publications of Couinaud. 5 refs.

1533 **THE VALUE OF HEPATIC SCINTIGRAPHY USING ^{198}Au.** *(Fr.)* Gevens, J. (Jules Bordet

Inst., Brussels, Belgium), J. Fruhling, M. Deschreyer, A. Dony and J. Henry. *Acta Gastroent. Belg.* 30(8-9):581-598, 1967.

Based on experience with 100 cases, it is concluded that scintillation scanning of the liver following i.v. injection of 150 μC of radioactive colloidal gold is a valuable technique for the diagnosis of metastatic liver cancer, hepatic cirrhosis, and tumors of the right hypochondrium, especially in cases where laparoscopy and liver biopsy are contraindicated. Since the colloidal gold is rapidly taken up by the Kupffer cells, the spleen and bone marrow are normally not visualized by this technique. In cirrhosis, however, the liver shows a heterogeneous appearance with relatively decreased capture of radioactivity resulting in visualization of the spleen and bone marrow. Hepatic "cold zones" can be of either neoplastic or parasitic origin, and often appear when the liver function tests are still essentially normal. Among 19 cases with metastatic cancer of the liver, e.g., the metastases were revealed by scintigraphy in 17 (2 of whom had normal liver function tests), while in the other two cases the metastases were less than 2 cm in diameter.

1534 THE PATHOGENESIS OF HEPATIC STEATOSIS IN EXPERIMENTAL ALCOHOLIC INTOXICATION. *(Fr.)* Mitkov, D. (I. P. Pavlov Inst. Med., Plovdiv, Bulgaria). *Acta Gastroent. Belg.* 30(7):523-530, 1967.

After 9 adult male albino rats had been given ethanol (5 g/kg) by stomach tube daily for 105 days, their livers showed pronounced steatosis (with a total lipid content of 23.05 g% compared to 17.00 in controls), low levels of β-lipoproteins (0.53 g% compared to 1.03 in controls), and an increase in the lipid/phospholipid ratio. The serum β-lipoproteins and total lipids were also decreased, although the lipolytic activity of the adipose tissue was essentially normal. It is concluded that chronic ingestion of alcohol produces a disturbance in β-lipoprotein synthesis in the liver which interferes with the secretion of triglycerides and results in the accumulation of neutral fat in the hepatic cells.

1535 SULFOBROMOPHTHALEIN (BSP) EXCRETION IN HEALTHY SUBJECTS FOLLOWING SUBCHRONIC ADMINISTRATION OF PHENOBARBITAL. *(Ger.)* Gerhardt, W. (Med. Clin., Friedrich Schiller U., Jena, Germany) and W. Klinger. *Deutsch. Zschr. Verdau. Stoffwechselkr.* 27(3/4):95-96, 1967.

Ten healthy males, 16-25 yr old, with normal liver function tests, who had taken no drugs for at least 4 weeks, were given 300 mg of phenobarbital by mouth daily for 7 days. Sulfobromophthalein excretion studies (using 5 mg/kg sulfobromophthalein) immediately before and after the course of phenobarbital showed that excretion was slightly but not significantly accelerated, the respective half-value times being 5'32" and 5'2". The respective extinction values were 0.514 and 0.468 at 5 min and 0.167 and 0.138 at 14 min. Liver function tests remained normal, and this displacement in the sulfobromophthalein excretion curve is ascribed to more rapid binding of the dye immediately after injection.

1536 HISTOPATHOLOGY OF THE LIVER IN DOWN'S SYNDROME. *(E.)* Seeff, L. B. (VA Hosp., Washington, D. C.), J. Levitsky, P. W. Tillman, M. L. Perou and H. J. Zimmerman. *Amer. J. Dig. Dis.* 12(11):1102-1113, 1967.

A comparative study of liver sections obtained at autopsy from 48 patients with Down's syndrome (24 males and 24 females, 5 days to 72 yr old, 46 Caucasian and 2 Negro, including 13 with a prior history of jaundice) and 48 matched controls (mostly institutionalized for mental deficiency of other types) revealed a significantly higher incidence of fatty liver, portal abnormalities and amyloid deposits in the mongoloid group. One or more hepatic abnormalities were seen in all 48 mongoloid patients and in 40 of 48 controls. The incidence of abnormalities ranged from 95.83% for portal abnormalities (72.91% in controls) to 68.75% for fatty liver (25% in controls) and 8.03% for amyloidosis (0% in controls). Both groups showed an approximately equal incidence of sinusoidal dilatation (81.25% of each group) and central vein sclerosis (60.42% among mongoloid patients and 64.58% in controls). Although cirrhosis, granuloma and acidophilic bodies were seen more frequently among mongoloids, the differences were not statistically significant. It is suggested that sinusoidal dilatation and central vein sclerosis may be somehow related to prolonged institutionalization, but that hepatic steatosis and amyloidosis could be a specific result of the chromosomal anomaly responsible for mongolism.

1537 CLINICAL STUDY ON PRIMARY CARCINOMA OF THE LIVER IN TAIWAN. *(E.)* Sung, J. L. (Natl. Taiwan U. Coll. Med., Taipeh, China), T. H. Wang and J. Y. Yu. *Amer. J. Dig. Dis.* 12(10):1036-1049, 1967.

A retrospective study of 151 histologically proven cases of primary carcinoma of the liver (133 males and 18 females) seen during the period 1954-63 revealed that the age of peak incidence was 41-50 yr (accounting for 31% of the cases) and that 81% were between the ages of 31 and 60; this age distribution is almost 10 yr younger than revealed by comparable studies in Caucasians and Japanese. Hepatoma accounted for 146 cases, cholangioma for 3 and hepatocholangioma for 2. Among the 19 cases which came to autopsy, 10 showed predominant involvement of the right lobe, one the left lobe, and 8 both lobes; 17 cases showed extrahepatic metastasis and 15 showed postnecrotic cirrhosis. Alcoholism, schistosomiasis, clonorchiasis, hepatitis and malnutrition were apparently not involved in the etiology of the tumors. There were no early or pathognomic symptoms or signs, the most common subjective complaints being abdominal pain or fullness, anorexia, weakness and weight loss. Objective examination revealed hepatomegaly in all but one case (liver weights from 1800 to 6200 g), in addition to fever, emaciation, abdominal distension, jaundice and ascites. The differential diagnosis from other hepatic or biliary diseases was also facilitated by determinations of serum alkaline phosphatase, lactic dehydrogenase, glutamic-oxaloacetic transaminase, the albumin/globulin ratio, and especially mucoprotein (which is decreased in cirrhosis but increased in 85.8% of the cases of hepatoma). Chest X-ray and scintillation scanning of the liver are also recommended. The survival time in 43 known cases varied from less than 3 months to 2 yr and 4 months after the onset of symptoms. Among 39 who died in the hospital, 16 died in hepatic coma, 11 died of hemorrhage, and 8 died of hemoperitoneum.

1538 CLINICAL DIAGNOSIS OF THE BUDD-CHIARI SYNDROME: A REPORT OF SIX CASES.

(E.) Clain, D. (Royal Free Hosp., London, England), J. Freston, L. Kreel and S. Sherlock. *Amer. J. Med.* 43(4):544-554, 1967.

In 5 of 6 patients (2 men and 4 women, 29-53 yr old) with hepatic vein occlusion (Budd-Chiari syndrome) of 1-2 yr duration, hepatic venography showed narrow or occluded hepatic veins and a distinctive pattern in adjacent vessels. In one, patent branches of a left hepatic vein were outlined after advancing a catheter through a partial occlusion of the ostium. In the same patient an injection of contrast medium into the parenchyma of the right lobe demonstrated complete obstruction at the ostia of two hepatic veins. In 5 patients the engorged liver caused extrinsic compression of the inferior vena cava, while portal hypertension was confirmed in 3 cases and 2 showed varices. Hepatic arteriograms and scintillation scans showed abnormalities which were apparently caused by hepatic venous occlusion. The presenting symptoms in these patients were ascites in 4 cases, dizziness in one and menorrhagia in one. Laboratory studies showed hyperbilirubinemia in 3 cases (all died), elevated alkaline phosphatase levels in all 6, and hypoalbuminemia in 5 of 6. In 3 cases the thrombosis could be established as due to polycythemia vera. Two of the 3 deaths were due to hepatic coma, the other to peritonitis, while in the remaining 3 cases the diagnosis was confirmed by biopsy. Five patients responded, at least temporarily, to a diuretic regimen and the importance of treating the underlying polycythemia vera is emphasized. It is concluded that an accurate diagnosis of the Budd-Chiari syndrome can be made with special radiological techniques, and that exploratory surgery is ill advised.

1539 ENZYMOLOGICAL AND HISTOLOGICAL CHANGES IN EXPERIMENTAL CHOLESTASIS.

(Ger.) Seidlová, V. (Inst. Path., Palacký U., Olomouc, Czechoslovakia), J. Dušek, V. Pelikán, H. Vaverkova, M. Kalab and Z. Sérova. *Deutsch. Zschr. Verdau. Stoffwechselkr.* 27(3/4):83-94, 1967.

The effect of extra- or intrahepatic cholestasis on serum bilirubin, plasma and RBC glutamic-oxalacetic transaminase, plasma arginase, plasma and RBC lactic dehydrogenase, plasma and RBC alkaline phosphatase, and the histology and histochemistry of the liver was studied in 96 adult male rats sacrificed at intervals of 1-20 days after ligation of the bile duct or poisoning with α-naphthylisothiocyanate. Extrahepatic cholestasis was produced by bilateral ligation of the choledochus, 5-8 mm from the duodenum, and was followed by marked proliferation of the biliary canaliculi, liver cell necrosis which increased sharply in the third week, and a sharp rise in serum enzyme and bilirubin levels which reached a maximum in 1-2 days and then decreased temporarily to rise again towards the third week. Intrahepatic cholestasis was produced either by a single dose of α-naphthylisothiocyanate (100 mg/kg p.o.) or by continual administration with the food (1 g/kg of Larsen diet). Rats given a single dose showed necrotizing cholangiitis, necrosis and dystrophic changes in the liver cells which reached a maximum in the fourth week; the serum enzyme levels showed a sharp rise in the first 24 hr and had returned to approximately normal levels, with the exception of the alkaline phosphatase, by the end of the third week. Continued administration of small doses of α-naphthylisothiocyanate led to connective tissue proliferation and consequent compression of the intermediate bile ducts in the 2nd-3rd week; the dystrophic changes in the liver cells were less marked than after a single large dose, and necrosis was rare. The serum enzyme levels showed a prolonged rise, with a maximum in the first 48 hr, which was particularly marked for the alkaline phosphatase. In contrast to the serum enzyme levels, the erythrocyte levels showed no change in any of these animals. It is suggested that this stability of the RBC enzymes may be useful in the differential diagnosis of obstructive and parenchymal jaundice, since RBC levels rise sharply following lesions to the liver parenchyma.

1540 EXPERIMENTAL GIANT-CELL TRANSFORMATION IN THE LIVER INDUCED BY *E. coli* ENDOTOXIN.

(E.) Campbell, L. V., Jr. (West Virginia U. Sch. Med., Morgantown) and E. F. Gilbert. *Amer. J. Path.* 51(5): 855-868, 1967.

When 6-week-old New Zealand albino rabbits were given *E. coli* endotoxin (0.05 mg/kg i.v.) every other day for 1-4 weeks, giant-cell transformation of the liver was found in 50% of those sacrificed at one week but in none of those sacrificed at 4 week In a longer experiment, 2-5 week-old rabbits were given 0.005 mg i.v. every other day for 6 weeks and then 0.025 mg i.v. every other day to sacrifice at the age of 16 weeks; however, the only result reported is that "30% of those biopsied at 4 weeks showed increased numbers of binucleated cells but no giant cells." Among 8 mature pregnant rabbits treated with *E. coli* endotoxin (10-50 μg every other day i.v.) at various stages of pregnancy, only one lived to term, producing 7 stillborn rabbits with focal areas of giant multinucleated cells in the livers. Finally, female Wistar rats were given the endotoxin (0.025 mg) i.p. every other day, either for 8 weeks (nonpregnan rats) or to term (rats treated after either 1 day, 1 week or 2 weeks of gestation). Microscopic examination of the livers revealed sporadic focal giant-cell reactions only in offspring sacrificed at birth or at the age of one week, not in those sacrificed later. The giant-cell lesions produced were characterized by small focal zones of parenchymal necrosis or areas of hepati degeneration, marginated by large, multinucleated, giant parenchymal cells. Calcified thrombi were occasionally seen in periportal veins and mineralization was present in some of the necrotic foci. A duct-like arrangement of liver cells was occasionally observed, and a significant degree of extramedullary hematopoiesis was seen in the fetal and neonatal animals. Reticulum appeared to surround but did not extend into the giant cells, suggesting that these actually represented a single regenerative cell. The resemblance between these experimental lesions and the giant-cell transformation of the human neonate ("neonatal hepatitis") suggests that at least one etiologic agent which is ubiquitous in man may be related to *E. coli* endotoxin The response to *E. coli* endotoxin also substantiates the theory that giant-cell transformation is a specific response of an immature liver to a variety of different stimuli.

1541 STUDIES ON THE PATHOGENESIS OF HEPATOLENTICULAR DEGENERATION. I. ACID PHOSPHATASE ACTIVITY IN COPPER-LOADED RAT LIVERS.

(E.) Lindquist, R. R. (Walter Reed Gen. Hosp. Washington, D. C.). *Amer. J. Path.* 51(4):471-481, 1967.

After administration of $CuCl_2$ (20-80 μM/kg/day i.p. for 1-2 weeks) to young male Sprague-Dawley rats, copper could be demonstrated cytochemically in the livers in the form of round granules, 0.3-2.5 microns in diameter, distributed around the canaliculi. Hepatic accumulation of copper paralleled the distribution of the lysosomes and was accompanied by a directly proportional increase in total acid phosphatase as determined biochemically with p-nitrophenylphosphate. For example, after 40 μM/kg/day for one week, the total acid phosphatase was 457 μM p-nitrophenylphosphate per μg protein per hr, compared to 340 in controls. Furthermore, 32% of this activity was now nonsedimentable (compared to 26% in controls), ndicating a shift of acid phosphatase from the lysosomes to the cytoplasm. Histochemical studies of the liver with Gomori's lead sulfide technique also showed increased acid phosphatase. The apparent decrease shown by the azo-dye technique could be explained by the inhibitory effect of copper on diazonium coupling *in vitro*. The results suggest that the mechanism of hepatolenticular degeneration seen in Wilson's disease may be related to a general release of enzymes from the lysosomes.

1542 BIOCHEMICAL STUDIES OF THE HEPATIC FAT IN FATTY LIVERS.

(Ger.) Berg, G. (Med. Clin., U. Erlangen-Nuremberg, Germany), U. Troll, H. Hahn and K. Elster. *Klin. Wschr.* 45(21):1084-1087, 1967.

Biochemical analyses of hepatic fat obtained by liver biopsy from 28 normal subjects, 13 with mild fatty livers, 12 with severe fatty livers (more than 50% fatty infiltration) and 14 with chronic liver disease showed that fatty infiltration of the liver is accompanied by a significant increase in the proportion of simple unsaturated fatty acids and a decrease in the saturated and polyunsaturated fatty acids of both the neutral lipid and phospholipid fractions. The changes are accounted for mainly by a replacement of stearic by oleic acid and decreases in linoleic and arachidonic acid,. The cholesterol fraction, on the other hand, shows little change in fatty infiltration, modifications being limited to an increase in linoleic acid and a decrease in arachidonic acid. Fatty infiltration was also accompanied by an increase in the β-globulins. Since these changes in fatty acid composition represent an alteration in the direction of the depot fat, it is postulated that fatty infiltration of the liver is caused by increased lipolysis leading to increased mobilization of depot fat. The changes in the cholesterol fraction would then be due to attempted compensation. As expected, diabetes and alcoholism were significantly more common among the patients with fatty liver and chronic liver disease.

1543 VALUE AND LIMITATIONS OF AN EPIDEMIOLOGICAL SURVEY OF CHRONIC LIVER DISEASE.

(It.) Dusi, U. (Gen. Med. Clin., U. Padua, Italy), P. Avogaro, G. Crepaldi and G. Enzi. *Minerva Med.* 59(10):504-514, 1968.

Among 2,013 apparently healthy subjects, including 1,741 blood donors (almost all males) and 272 patients (197 males and 75 females) with various minor illnesses (mostly neurosis), all 20-60 yr of age, 150 (7.4%) were found to have abnormal levels of serum glutamic-oxaloacetic or glutamic-pyruvic transaminase, and 53 of these 150 had an inverted SGOT/SGPT ratio. Of these 150, 41 were subjected to further liver function tests, and 25 were subjected to liver biopsy (23 successfully). On the basis of the histological findings, these 23 cases could be divided into 4 groups: 1) 3 patients showing only bile-pigment infiltration, probably ascribable to the late sequellae of viral hepatitis; 2) 6 alcoholic patients with fatty infiltration of the liver and hyperbilirubinemia; 3) 6 other alcoholics in which fatty infiltration was accompanied by cytolysis and connective tissue infiltration indicative of cirrhosis (3 of these showed pathological sulfobromophthalein retention); 4) and 8 cases with the most marked increases in enzyme levels and most consistent inversion of the SGOT/SGPT ratio, in which fatty infiltration was accompanied by severe inflammatory infiltration as well as signs of cytolysis and sclerosis (6 of these 8 patients also had hypergammaglobulinemia). There was a direct correlation, moreover, between the serum glutamic-oxaloacetic transaminase levels and the degree of fatty infiltration. The increased serum enzyme levels thus indicated fatty infiltration of the liver in 6 of 23 cases and subacute or chronic hepatitis or cirrhosis in 14 of 23 cases, 9 of 14 being due to alcoholism and 5 of 14 probably to viral hepatitis. Among the 18 of 41 cases from whom no histological findings could be obtained, one had a history of hepatitis and 10 were alcoholics. Finally, repeat determinations of the serum enzyme levels in 726 blood donors 3-4 months later revealed abnormal values in 23 of the 53 cases in which the values were abnormal the first time, while in 30 cases, the serum enzyme levels had returned to normal limits. Serum transaminase determinations are recommended as a useful technique for the detection of hepatitis and cirrhosis.

1544 EXPERIMENTAL OBSERVATIONS ON THE LIPIDS ACCUMULATED IN THE LIVERS OF RATS FED A CHOLINE-FREE DIET.

(It.) Ugazio, G. (Inst. Gen. Path., U. Turin, Italy), L. Gabriel and E. Burdino. *Sperimentale* 117(1):1-17, 1967.

Male Sprague-Dawley rats which were maintained on the choline-deficient basal diet B of Young et al. (*Canad. J. Biochem.* 34:713, 1956) still gained weight, but more slowly than those fed the same diet plus 0.6% choline. Studies in rats sacrificed after 15, 24, or 168 hr showed that the relative weight of the liver (as % of body weight) decreased in rats on a complete diet, but remained essentially static in choline deficiency. After one week, the total lipids (in mg/g of liver) were increased to 181.5 in choline-deficient rats compared to 38.5 in controls, and the fatty infiltration of the liver seemed to be aggravated by prior treatment of the rats with iron or selenium. More detailed analysis showed that the increase in lipids during the first 24 hr was entirely due to triglycerides, after which other lipid fractions also increased, and at one week the liver triglyceride content (in mg/100 g body weight) was 929.2 in choline-deficient rats and 66.7 in controls. At the same time, the lipid content of the microsomal fraction (calculated in terms of mg/g of liver) was decreased in the choline-deficient animals. After one week on a deficient diet, the degree of diene conjugation of the unsaturated fatty acids, as determined by the optical density of the liver extracts at 233 mμ, both immediately and after irradiation with ultraviolet light for 48 hr, was increased, but this increase was less than the increase in total lipids, so that the "specific optical density" was decreased; there was also a decrease in the percentage of unsaturated fatty acids compared to rats on a complete diet. These changes are not believed to be due to dilution of the liver fatty acid pool with saturated triglycerides, but rather to oxidation of the unsaturated fatty acids present. The amount of fatty acids recoverable by alkali extraction of the defatted dry residue of liver tissue (ascribed to the presence of fatty acids polymerized with proteins) was increased in choline deficiency, which may also indicate exhaustion of the pool of oxidizable substrate as fatty infiltration progresses. It is pointed out, however, that these changes in lipid oxidation are seen only in the later stages of fatty infiltration, accompanied by necrosis and cirrhosis, so that they must be looked upon as a secondary phenomenon of choline deficiency and not as the cause of the hepatic steatosis.

1545 LIVER OPACIFICATION FOLLOWING LYMPHANGIOGRAPHY: PATHOGENESIS AND CLINICAL SIGNIFICANCE. *(E.)* Chavez, C. M. (U. Hosp., Jackson, Miss.), J. D. Picard and D. Davis. *Surgery* 63(4):564-570, 1968.

In a world-wide survey of 18,371 lower-extremity lymphangiograms, hepatic oil embolisms have occurred in only 36 cases. There is no consistent relation between the incidence of embolism and the types of oil contrast media used. Primary metastatic malignant lymph node lesions involving the lumbosacral region were reported in 34 out of 35 cases with primary pathology. Neoplastic obstruction of lumbopelvic lymphatics had obliterated all collateral pathways shunting lymph into the veins. Lymphovenous communications between lower-extremity lymphatics and the portal venous system determine the incidence of oil embolisms in lymphangiography.

1546 THE TECHNIQUE OF ORTHOTOPIC LIVER HOMOTRANSPLANTATION IN THE PIG. *(E.)* Terblanche, J. (Dept. Surg., U. Bristol, England), J. H. Peacock, J. B. Bowes and K. E. F. Hobbs. *J. Surg. Res.* 8(4):151-160, 1968.

A method for orthotopic liver homotransplantation in the pig is described. Blood and fluid transfusion and inhalation anesthesia with endotracheal intubation for respiratory regulation are detailed. Arterial and central venous pressure are monitored, and electrocardiograms are made; blood pCO_2, pH, O_2 saturation and glucose are determined regularly. Techniques applied to donor and recipient animals are presented, and some aspects of postoperative care, such as acid-base and glucose determinations, bicarbonate administration, and antibiotic therapy are discussed. It is hoped that this presentation will be valuable to researchers contemplating studies using pigs.

1547 EFFECT OF PROTEIN HYDROLYSATE ADMINISTRATION ON LIVER COMPOSITION. *(E.)* Alston, W. C. (Western Infirm., Glasgow W.1, Scotland) and R. Y. Thomson. *Cancer Res.* 28(4):746-752, 1968.

Intravenous administration of a 10% protein hydrolysate to adult female rats at a level of 1 gm protein/kg body weight/hr over 12 hours was followed by significant increases in the average content of RNA per cell in the liver. Similar but larger increases in RNA per cell were obtained after 44 or 48 hours intraperitoneal administration at the same level, accompanied this time by a significant increase in mitotic activity. Investigation of the time course of these changes showed that RNA per cell increased sharply during the first 24 hours of treatment and again between the 38th and 42nd hours, but that mitotic activity did not increase until about 48 hours. The protein content per cell showed the same pattern of increase as RNA, but the changes were less clear-cut.

1548 THE TECHNIQUE OF PALLIATIVE SURGERY FOR ALVEOLAR ECHINOCOCCOSIS OF THE LIVER. *(Rus.)* Dederer, Iu. M. (Altai Med. Inst., Barnaul, USSR) and N. P. Krylova. *Klin. Khir.* (2):16-19, 1968.

Among 262 cases of alveolar echinococcosis treated in the period 1956-65, 189 received a variety of palliative operations, including: resection of the parasitic nodule (40 cases), drainage of the nodule (45 cases), infiltration of the nodule with parasitotropic agents (67 cases), and operation on the bile ducts (37 cases); in 7 other cases only an exploratory laparotomy was possible. Among 40 patients treated by palliative resection of the parasitic nodule, 11 were lost to follow-up, 12 died, 4 are in serious condition, and 13 are well, all of the latter having benefited from excision of a large part of the germinative layer of the parasite by means of a combination of fragmentation and enucleation. Drainage of the nodule resulted in its complete disappearance in 9 of 45 cases, possibly because of the simultaneous use of 0.1% trypaflavin. Infiltration of the parasite with antiparasitic agents is the simplest but also the least effective of the palliative procedures, due to difficulty in reaching all of the echinococcal tissue; a tuberculin syringe is helpful in this regard. Operations on the bile ducts were carried out to relieve obstructive jaundice in 37 cases, 23 of whom showed immediate good results. The generally ineffective technique of Longmire-Dogliotti has been replaced by drainage through the liver by the method of Sullivan-Wilms (modification of Bregadze); i.e., a large bile duct is punctured via the liver by means of a needle and trocar and the tunnel through the liver is enlarged by electrocoagulation, after which a rubber drain is inserted into the bile duct and brought out through the liver into a loop of small intestine, isolated by the method of Roux, which should be at least 40-50 cm long and is sutured to the liver by a double row of sutures.

1549 TREATMENT OF THE BLOOD VESSELS AND BILE DUCTS DURING RESECTION OF THE LIVER. *(Rus.)* Umbrumiants, O. A. (Sci.-Res. Inst. Clin. Exp. Surg., Min. Health USSR, Moscow). *Klin. Khir.* (2):1-6, 1968.

Resection of the liver is generally now performed along the relatively avascular sulci which divide the liver into a number of segments, each of which has two peduncles or capsules: a Glisson's capsule surrounding the branches of the portal vein, hepatic artery and hepatic bile duct, and a caval capsule surrounding the branch of the hepatic vein. The proper ligation of these peduncles during surgery, which is necessary to prevent necrosis, hemorrhage, bile peritonitis and other complications, requires an accurate knowledge of their position and structure. Simultaneous blind ligation of all the Glisson's capsules is dangerous, except in the 3rd, 4th and 5th segments, since the large hepatic veins generally pass quite close to the capsules and can easily be damaged. Ligating the capsules individually by the technique of Couinaud and Tung is hampered by the difficulty of finding the avascular sulci and the fact that the peduncles tend to run close to the lower surface of the liver. Detailed radiological and anatomical studies of the Glisson's capsules in 100 liver preparations revealed that the distance from the capsule to the upper surface of the liver varies from 2.3 to 4.9 cm, while that from the capsule to the lower surface of the liver varies from 0.0 to 1.1 cm. A technique is therefore proposed for the simultaneous ligation of all the vessels and bile ducts of a particular sector or segment from the lower surface, avoiding the danger of interfering with the blood supply to neighboring segments. In each case, after determining the proper orientation, the capsule is incised and the peduncle is lifted free with the fingers or an instrument; a ligature is then placed on the distal portion where there are no vessels or bile ducts leading to other areas of the liver. The value of this technique has been confirmed by clinical observations.

1550 **PARTIAL LIVER TRANSPLANTATION WITH PRIMARY REVASCULARIZATION IN DOGS: PRELIMINARY REPORT ON NEW METHOD AND ITS THEORETICAL BACKGROUND.** *(E.)* Aoki, H. (Keio U. Sch. Med., Tokyo, Japan), T. C. Wang, H. Matsumura, T. Funabiki, Y. Kakumoto and T. Hatori. *Keio J. Med.* 16(4):205-221, 1967.

Four techniques are described for partial heterotopic transplantation of the left lateral lobe of the liver with immediate reconstruction of the hepatic circulation and external fistulization of the bile duct. In Group I (4 dogs), the lobe was transplanted to the right renal region, following right nephrectomy, and the portal system was arterialized by anastomosing the portal vein to the right renal artery and the hepatic vein to the right renal vein; the hepatic artery was ligated in all of these cases. In Group II (6 dogs), the lobe was transplanted to the right infrarenal region and the blood supply was reconstructed by anastomosing the portal vein to the mesenteric vein and the hepatic vein to the inferior vena cava; in 3 of these animals the hepatic artery was ligated and in 3 (following homotransplantation) it was anastomosed to the abdominal aorta or the mesenteric artery. In Group III (6 dogs), the lobe was transplanted to the subcutaneous region of the right thigh, the portal vein was anastomosed to the distal end of the right femoral vein, and the hepatic vein was anastomosed to the proximal end of the right femoral vein; in 4 of these animals the hepatic artery was ligated at the time of operation and in the other 2 it had been ligated 1-3 weeks preoperatively. In Group IV (8 dogs), the lobe was transplanted into the right iliac fossa or pelvis, the portal vein was anastomosed to the distal end of the right iliac vein, and the hepatic vein was anastomosed to the inferior vena cava; in 2 of these animals the hepatic artery was ligated at the time of operation, in one it had been ligated 1-3 weeks before, and in 5 (including one dog following homotransplantation) the hepatic artery was anastomosed to the right iliac artery. Using these techniques, 20 auto- and 4 homotransplantations were performed in 28 adult mongrel dogs, all without immunosuppressive therapy. The time between interruption of blood supply and the beginning of perfusion of the transplanted lobe was 3 minutes or longer, and completion of the anastomosis required from 62 to 136 min (average 92.7 min). Only 4 of these dogs survived more than 2 days postoperatively, including one in Group I which survived 2.5 days, one in Group II (homotransplantation with anastomosis of the hepatic artery) which survived 10 days, one in Group III (12 days), and one in Group IV (homotransplantation with anastomosis of the hepatic artery) which was sacrificed at 3.5 months; 3 died during the operation, 8 more within 12 hours, and 9 in 12-48 hours. At autopsy, most of the dogs showed obstruction of the vessels, particularly the portal vein, with hepatic ischemia and coagulation necrosis. The 6 dogs which died within 12 hours despite patent anastomoses showed atrophy of the liver due to marked congestion which was ascribed to "outflow block." In the dogs surviving 10-12 days, the liver showed hemorrhage and complete loss of structure, while in the one surviving 3.5 months the transplant had been completely replaced by scar tissue. On the basis of these results, it is felt that transplantation to the right infrarenal region with anastomosis of the hepatic artery to the abdominal aorta or a branch of the mesenteric artery is the best procedure.

1551 **RECOGNITION AND PREVENTION OF INTRAOPERATIVE WARM-ISCHAEMIA IN LIVER TRANSPLANTATION.** *(E.)* Immelman, E. J. (Dept. Surg., U. Bristol, England), J. H. Peacock, K. E. F. Hobbs, S. K. Mitra, A. C. Hunt and J. B. Bowes. *Brit. Med. J.* 2(5529): 220-223, 1968.

A study of the intraoperative temperature changes in the liver transplant during sham and actual hepatic transplantation in pigs revealed a very rapid increase between the placement of the cooled donor organ into the abdominal cavity of the recipient and its final revascularization. The temperature rose from 8-10C to 25C or higher in 15-30 min, at an initial rate of 0.7C/min, resulting in a period of warm ischemia before revascularization lasting 30-45 min. Since the rate of temperature rise was not affected by cyanide poisoning, the rapid increase is ascribed to heat gain from the surrounding warm body tissues. It can be prevented, as in the case of renal transplantation, by the use of insulating casings of polyethylene or ethyl vinyl acetate, which reduce the rate of warming to about 0.1C/min and are much simpler than the use of total body hypothermia or continuous cold perfusion. It is felt that the prevention of warm ischemia will also prevent the hemorrhagic tendencies, metabolic acidosis, hypotension, cardiac arrhythmias and liver dysfunction so often seen after otherwise successful liver transplants.

1552 **DIFFERENTIAL DIAGNOSIS BETWEEN DIABETIC AND ALCOHOLIC FATTY LIVER: A STUDY OF 171 DIABETICS AND 100 CHRONIC ALCOHOLICS.** *(E.)* Robbers, H. (Furst-Carl Distr. Hosp., Sigmaringen/Hohenzollern, Germany), P. Strohfeldt and C. Kruger. *German Med. Monthly* 8(3):124-125, 1968.

Liver biopsies performed in 171 diabetic patients revealed 120 with fatty liver, 17 with cirrhosis, 6 with hepatitis, 4 with congestion, periportal fibrosis or cholangitis, and 22 normal livers. The 17 cases of cirrhosis were due to alcoholism (10 cases), chronic hepatitis (4 cases), chronic cholangitis (1 case) or unknown factors (2 cases). Further study of the 120 diabetics (63 men and 57 women) with fatty livers revealed siderosis in 29 men and 7 women (compared to 57 of 100 alcoholics), glycogen-containing liver-cell nuclei in 39 men and 52 women (4 of 100 alcoholics), elevated serum bilirubin in 21 men and 10 women (64 of 100 alcoholics), elevated glutamic-oxaloacetic transaminase levels in 17 men and 4 women (67 of 100 alcoholics), elevated glutamic-pyruvic transaminase levels in 15 men and 3 women (47 of 100 alcoholics), dyspepsia in 20 men and 10 women (62 of 100 alcoholics), and alcoholism in 35 men and 4 women. It is concluded that purely diabetic fatty liver is not accompanied by pathological laboratory findings and is merely a "silent" effect of metabolic disturbances in the liver. There is an overlap, however, between diabetic and alcoholic fatty liver, the alcoholism being responsible for the associated abnormalities.

1553 CHRONIC ACTIVE HEPATITIS WITH LUPUS NEPHRITIS. [TWO CASES] *(E.)* Benner, E. J. (U. Oregon Med. Sch., Portland), R. T. Gourley, R. A. Cooper, Jr. and J. A. Benson, Jr. *Ann. Int. Med.* 68(2):405-413, 1968.

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1556 FATTY INCLUSIONS AND MICROCYSTS: THIOACETAMIDE INDUCED FATTY INCLUSIONS IN NUCLEI OF MOUSE LIVER CELLS AND HEPATOMA CELLS. *(E.)* Smith, E. B. (VA Hosp., Ann Arbor, Mich.), J. S. Nosanchuk, B. Schnitzer and R. L. Swarm. *Arch. Path.* 85(2):175-178, 1968.

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1562 COMPARATIVE STUDIES ON SERUM, LIVER AND AORTA LIPIDS IN RATS FED "ATHEROGENIC" DIET. *(E.)* Moretta-Maggiore, L. (Superior Inst. Health, Rome, Italy), G. Casparrini, G. Moretti, R. Angelico and G. Cavina. *G. Arterioscler.* 5(6):629-634, 1967.

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1565 STUDIES OF BLOOD FLOW AND ULTRASTRUCTURAL CHANGES IN REJECTING AND NONREJECTING CANINE ORTHOTOPIC LIVER HOMOGRAFTS. *(E.)* Groth, C. G. (U. Colorado Sch. Med., Denver), K. A. Porter, J. B. Otte, P. M. Daloze, T. L. Marchioro, L. Brettschneider and T. E. Starzl. *Surgery* 63(4):658-668, 1968.

1566 LEBER- UND GALLENWEGSERKRANKUNGEN (DISEASES OF THE LIVER AND BILE DUCTS). *(Ger.)* Bruhl, W. and H. Kalk. Stuttgart, Georg Thieme Verlag, 1966. 247 pp.

1567 ADVANCES IN HEPATOLOGY: TRANSACTION OF THE INTERNATIONAL SYMPOSIUM OF THE INTERNATIONAL ASSOCIATION FOR THE STUDY OF THE LIVER. *(E.)* Vandenbroucke, J. (Brussels, Belgium), J. De Groote and L. O. Standaert [Eds.] Baltimore, Williams & Wilkins, 1965. 390 pp.

1568 EUROPEAN VIEWS ON LIVER DISEASE. [REPORT OF THE 2ND MEETING OF THE EUROPEAN ASSOCIATION FOR THE STUDY OF THE LIVER, GOTHENBURG, SWEDEN, SEPT. 22-24, 1967.] *(E.)* Editorial. *Brit. Med. J.* 4(5573):232, 1967.

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1592 **THE ISOLATED TUBERCULOSIS OF THE LIVER (REPORT OF TWO CASES).** *(Fr.)* Brizon, J. (Tours), J. Delplace, A. Benatre and J. Bertrand. *Arch. Francaises Des Mal. de l'Appar. Digest.* 57(1):75-88, 1968.

1593 **EXTENDED SURVIVAL IN 3 CASES OF ORTHOTOPIC HOMOTRANSPLANTATION OF HUMAN LIVER.** *(E.)* Starzl, T. E. (U. Colorado Sch. Med.), C. G. Groth, L. Brettschneider, J. B. Moon, V. A. Fulginiti, E. K. Cotton and K. A. Porter. *Surgery* 63(4):549-563, 1968.

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1596 **TREATMENT OF DISEASES OF THE LIVER.** *(E.)* Berris, B. (New Mt. Sinai Hosp., Toronto). *Appl. Ther.* 10(4):262-264, 1968.

1597 **THE HISTOCHEMICAL PROPERTIES AND ORIGIN OF LIPOFUSCIN IN SOME PATHOLOGICAL CONDITIONS OF THE LIVER.** *(Rus.)* Zolotarevskii, V. B. (I. M. Sechenov Moscow Med. Inst., USSR). *Arkh. Pa.* 30(1):21-24, 1968.

See also abstract nos.: 891,892,931,937,941,947,1022,1179

1598 IS DELAYED RUPTURE OF THE LIVER OF PRACTICAL IMPORTANCE? *(Ger.)* Clemens, M. (Munic. Hosp., Karcag, Hungary), Z. Mikola and G. Molnar. *Bruns Beitr. Klin. Chir.* 216(1):67-74, 1968.

The clinical picture and possible pathogenesis of delayed rupture of the liver (secondary rupture of the capsule and consequent intraabdominal hemorrhage some time after blunt trauma to the abdomen resulting in intracapsular liver injury) are discussed on the basis of 5 personal cases (males, 18-48 yr old). It is pointed out that delayed intraabdominal bleeding following blunt trauma is not rare, and that the mortality after trauma to the liver remains high (30-40%), due at least in part to the difficulty of diagnosing intracapsular bleeding until rupture has taken place. Three stages in the development of this condition can be distinguished: the initial trauma and early symptoms (pain in the area of the liver and possible hepatomegaly and/or shock); a symptom-free interval of days or even weeks; and a sudden intraabdominal hemorrhage and collapse. This delayed hemorrhage can be due either to the rupture of a subcapsular hematoma, renewed intrahepatic bleeding following its temporary stoppage by a drop in blood pressure, local clotting or tamponade by internal organs, or the deepening of a superficial hepatic injury. Close supervision is urged over all accident victims in whom trauma to the liver can be suspected.

1599 ALCOHOL-INDUCED HEPATIC INJURY IN NONALCOHOLIC VOLUNTEERS. *(E.)* Rubin, E. (Mt. Sinai Sch. Med., City U. New York City) and C. S. Lieber. *New Eng. J. Med.* 278(16):869-876, 1968.

In 3 healthy young women (23-26 yr old; 2 Caucasian Jewish and 1 Korean) on a standard diet (16% protein, 36% fat and 48% carbohydrate), isocaloric substitution of ethanol for carbohydrate in gradually increasing amounts (24% of total calories for 4 days, 36% for 2 days and 46% for 2-8 days), administered as 68-130 g of alcohol in 8 divided doses daily, led to marked hepatic fat accumulation and changes in ultrastructure (focal necrosis, appearance of cytoplasmic lipids, enlargement and distortion of the mitochondria, vesiculation of the endoplasmic reticulum with an irregular distribution of the ribosomes, accumulation of osmiophilic material within the cisternae of the smooth endoplasmic reticulum, focal cytoplasmic degradation, and dilatation of the cisternae of the Golgi apparatus). Essentially the same results were obtained in 2 men (19-25 yr old; Caucasian) on a high-protein low-fat diet (25% protein, 25% fat and 50% carbohydrate) in which alcohol was isocalorically substituted for carbohydrate in the same way. All subjects received daily supplements of vitamins and minerals. In 7 other subjects (6 men and 1 woman, 20-32 yr old; 6 Caucasian and 1 Negro) on either the standard diet (3 subjects) or a high-protein minimal-fat diet (25% protein, 5% fat and 70% carbohydrate; 4 subjects), addition of ethanol (180-270 g/day for 2 days) also resulted in hepatic lipid accumulation, even though the blood alcohol levels usually remained below 80 mg% and the subjects were never obviously intoxicated. All of the subjects suffered occasional headaches and nausea, and most showed occasional euphoria, but slurring of speech and ataxia were absent. The serum glutamic-oxaloacetic transaminase increased after ingestion of alcohol in several cases but did not change significantly in others. It is concluded that ethyl alcohol is hepatotoxic in normal subjects, independent of nutritional factors, and in doses which are too low to produce frank intoxication.

1600 MANAGEMENT OF BLUNT TRAUMA TO THE LIVER AND HEPATIC VEINS. *(E.)* Schrock, T. (U. California Sch. Med., San Francisco), F. W. Blaisdell and C. Mathewson, Jr. *Arch. Surg.* 96(5):698-704, 1968.

Review of the 61 patients (47 males and 14 females, 2-65 yr old) with liver injuries admitted to the San Francisco General Hospital in 1960-66 revealed 32 with stab wounds, 9 with gunshot wounds, and 20 with blunt trauma. Only 2 died from penetrating wounds but 13 died of blunt trauma (8 in the emergency room, 4 in the operating room and one on the 2nd postoperative day), 11 of these deaths being due to uncontrollable hemorrhage. Hepatic vein injury was found in 3 of the 20 cases and was uniformly fatal. A new technique for controlling suprarenal vena cava and hepatic vein injury was therefore developed, based on cadaver studies of the hepatic anatomy. In this technique, the hepatic veins and retrohepatic inferior vena cava are exposed by an anterior approach, with blunt dissection through the interlobar fissure following a right thoracoabdominal incision. The liver is isolated by occlusion of the porta hepatis and the inferior vena cava above and below the liver, with a temporary bypass from the inferior vena cava to the right atrial appendage. The avulsed hepatic veins and inferior vena cava can then be repaired, although the right hepatic lobe is sacrificed. The operation is completed by cholecystectomy, T-tube choledocotomy, coverage of the raw liver with omentum, and adequate peritoneal drainage. The successful use of this technique is illustrated by the case of a 4-yr-old Negro girl with 4 avulsed right hepatic veins and a lacerated inferior vena cava due to a fall. The hepatic circulation was successfully reestablished, although the patient died of brain damage and cervical fracture.

1601 PATHOGENETIC FACTORS ASSOCIATED WITH CARBON TETRACHLORIDE POISONING. *(Rum.)* Manu, P. (Inst. Med. Pharm., Bucharest, Rumania), N. Preda, N. Muica and C. Dumitriu. *Med. Intern. (Bucur)* 20(1):59-64, 1968.

1602 SURGICAL TREATMENT OF LIVER INJURY IN CHILDREN. *(Pol.)* Czechowska, L. (Mil. Hosp., Opole, Poland). *Pol. Tyg. Lek.* 23(7):228-229, 1968.

1603 CARBAMAZEPINE-INDUCED JAUNDICE. *(E.)* Ramsay, I. D. (King's Coll. Hosp., London, England). *Brit. Med. J.* 4(5572):155, 1967.

1604 INFLUENCE OF TOXIC LIVER DAMAGE BY CARBON TETRACHLORIDE ON THE COLLAGEN CONTENT OF GRANULATION TISSUE IN RATS. *(Cz.)* Weissová, J. (Res. Inst. Rheum. Dis., Prague, Czechoslovakia), J. Musil and M. Adam. *Čas. Lék. Česk.* 107(9):274-276, 1968.

1605 NECROSIS OF LIVER CELLS IN ACUTE CARBON TETRACHLORIDE POISONING. *(Rev.)(Pol.)* Kaszewska-Jablońska, I. (1st Clin. Int. Dis., Acad. Med., Gdansk, Poland). *Pol. Arch. Med. Wewn.* 40(1):125-130, 1968.

1606 THE EFFECT OF OXYTERRACIN ON THE RAT LIVER CELL IN THE COURSE OF PREGNANCY AND ESTRADIOL AND DURABOLIN TREATMENT. (PART II). *(Pol.)* Bielawski, W. (1st Int. Dis. Clin., Acad. Med., Gdansk, Poland). *Pol. Arch. Med. Wewn.* 40(1):15-20, 1968.

1607 TRAUMA OF THE LIVER (VOL. III IN MAJOR PROBLEMS IN CLINICAL SURGERY). *(E.)* Dunphy, J. E. Philadelphia, W. B. Saunders, 1965. 134 pp.

1608 GRANULOMATOUS HEPATITIS ASSOCIATED WITH SULFADIMETHOXINE HYPERSENSITIVITY. [CASE REPORT] *(E.)* Espiritu, C. R. (State U. New York, Downstate Med. Ctr., Brooklyn), T. S. Kim and R. A. Levine. *J.A.M.A.* 202(10):985-988, 1967.

1609 STUDIES IN HEPATIC INJURY INDUCED BY EXPERIMENTAL PORTACAVAL SHUNTS. *(E.)* Rubin, E. (Mt. Sinai Sch. Med.,New York City). *Israel J. Med. Sci.* 4(1):155-158, 1968.

1610 BILE EMBOLIZATION FOLLOWING HEPATIC TRAUMA. *(E.)* Doyle, W. F. (Walter Reed Army Med. Ctr., Washington, D.C.) and J. M. Gray. *Arch. Path.* 85(5):559-561, 1968.

1611 SERUM CERULOPLASMIN IN ACUTE VIRAL HEPATITIS. *(E.)* Hauftová, D. (1st Med. Clinic, Palacky U., Olomouc, Czechoslovakia), J. Slavíček, J. Fialová and H. Vizinová. *Gastroenterologia* 108(6):309-316, 1967.

Serum ceruloplasmin and other biochemical determinations were made in 93 patients with viral hepatitis. In 71 patients with uncomplicated disease and uneventful course, the highest ceruloplasmin values were observed during the first week after onset of disease. They decreased gradually and returned to normal during the fourth week. When the cholestatic form of the disease or its coincidence with pregnancy was present, the ceruloplasmin values were higher and remained so for a longer period than in the uncomplicated forms of viral hepatitis. In liver coma, the serum ceruloplasmin value was found to be low. It is concluded that the determination of serum ceruloplasmin levels in viral hepatitis is of little significance in the diagnosis and clinical evaluation of the disease.

1612 WORKMEN'S COMPENSATION IN CHRONIC HEPATITIS. *(Ger.)* Hofmann, H. (United Health Svc. Hosp., Borna Distr., Leipzig, Germany). *Deutsch. Zschr. Verdau. Stoffwechselkr.* 27(3/4):97-101, 1967.

In a review of the difficulties in evaluating the risk and degree of disability due to viral hepatitis, the point is made that the central problem is really the diagnosis of chronic hepatitis. In order to avoid either of the two possible extremes (either an over-evaluation of the significance of minor complications in the course of acute hepatitis, leading to a hypochondriacal fear of chronic liver disease, or the neglect of those supportive measures which can promote recovery during the early stages of chronic hepatitis), the problem is approached from four main aspects: 1) the best time for deciding on the degree of probable disability; 2) the estimated frequency of complications following acute hepatitis; 3) the question of the relationship between chronic and acute viral hepatitis; and 4) measures to be taken when chronic hepatitis has been diagnosed. The degree of disability can usually be evaluated after a period equaling 50-100% of the duration of hospitalization, when the gross hepatomegaly, serum bilirubin and pyruvic transaminase levels have returned to normal, but before normalization of all the liver function tests or disappearance of all the minor autonomic complaints. At the 12-month mark, residual hypergammaglobulinemia and the presence of not only isolated stellate proliferation but also periportal infiltration in the liver biopsy are signs of chronic hepatitis. The normal duration of disability following acute viral hepatitis increases with age and varies from about 2 months in young uncomplicated cases to 20 months in older cases with recurrence. A review of the literature shows the development of chronic hepatitis in an average of 13.8% of all cases, but this might be reduced to 5% or even to 1.4% (as in 760 personal cases) by proper consideration of transitory complications, recurrences and biopsy findings. On the other hand, chronic hepatitis can still develop 10-17 yr after an acute attack, and a history of viral hepatitis is reported in the literature for 51.5% of all cases of chronic hepatitis. The danger is particularly high in older patients with severe or recurrent illness or prior liver damage. The development of even chronic hepatitis into debilitating cirrhosis can be prevented by proper therapeutic measures, including prolonged bed-rest. In general, however, the percent disability in chronic hepatitis can be estimated at 40-80%.

1613 A CONTRIBUTION TO THE PROBLEM OF HEPATITIS EPIDEMICA. *(Ger.)* Procházka, D. (Hyg.-Epidemiol. Station, Karlovy Vary, Czechoslovakia) and A. Gebhart. *Zbl. Bakt. [Orig.]* 205(4):465-477, 1967.

The epidemiological and clinical characteristics of viral hepatitis, its diagnosis, and the prophylactic and therapeutic value of γ-globulin or so-called active-passive immunization are discussed on the basis of experience with 1730 cases seen over a 5-yr period. Analysis of the data shows that the etiological agent of viral hepatitis is ubiquitous and that the disease, in either frank or subclinical form, is extremely widespread. The most severely affected age group consists of children between 5 and 10, while the incidence is relatively low (5-20/10,000) in infants and adults. Assuming a ratio of 1:7 between diagnosed and subclinical or abortive forms, as shown by an analysis of 43 foci of infection with 384 patients, the incidence of a history of hepatitis rises from 20% among 5-yr-old children to 60% among 10-yr-olds and 80% among young adults. Seasonally, the incidence of viral hepatitis usually shows a peak during the autumn, due to increased contact between children in the schools. Intimate and repeated contact is considered to be the main factor in the spread of an epidemic, regardless of sanitary conditions. An epidemic focus remains active over a period of about 28 weeks, due to the prolonged excretion of virus by persons with abortive or subclinical forms. About 56% of the cases in an epidemic focus are affected during the first 6 weeks, the other 44% being spread over the remaining 22 weeks. With an infectivity rate of 45%, it can be assumed that all of the susceptible persons in a focus will have acquired the disease within 26-30 weeks. Only 4.3% of the cases, mostly children, represent epidemics limited to the family. Early and correct diagnosis is made difficult by the lack of significant prodromal symptoms and the absence of reliable laboratory tests. Since negative liver-function tests do not necessarily exclude the possibility of viral hepatitis, the clinical diagnosis must be supplemented by information about the epidemiological situation and the history of the patient. The most significant symptom is hepatomegaly with tenderness on palpation, but even this symptom is sometimes of short duration. The thymol turbidity test is the most reliable of the liver-function tests. Even so, only 67% of the cases can be isolated within one week after the first symptoms of the disease, and more than 10% usually avoid detection for at least 2 weeks. Administration of γ-globulin is of value only for the protection of the individual patient, since it reduces the clinical symptoms without preventing the spread of the virus. As a result, the number of inapparent and latent infections is increased and the epidemic continues to spread. Increasing the dose of γ-globulin merely serves to increase the number of missed cases and cannot aid in breaking the epidemiological chain.

1614 BLOOD PYRUVATE LEVELS AND MAXIMAL TUBULAR p-AMINOHIPPURIC ACID (PAH) TRANSPORT IN VIRAL HEPATITIS. *(Ger.)* Dittrich, P.

(Med. Clin., U. Innsbruck, Austria). *Klin. Wschr.* 45(21): 1110-1111, 1967.

Studies in 8 normal subjects (1 male and 7 females, 14-43 yr old) and 11 patients with viral hepatitis (1 male and 10 females, 22-64 yr old) revealed a positive correlation (r = 0.738) between the blood pyruvate levels and the maximal tubular PAH excretion (TmPAH). The average blood pyruvate concentration was 1.16 mg% in the hepatitis patients and 0.78 mg% in controls; this correlated with an average TmPAH of 118.7 in patients and 93.25 in controls, and with an average PAH clearance of 445 ml/min in the patients and 640 ml/min in controls. It is suggested that the increased pyruvate levels are in some way responsible for the effect on PAH excretion.

1615 EPIDEMIC VIRAL HEPATITIS IN CHILDREN. *(Fr.)* D'Oelsnitz, M. (Nice, France). *Concours Med.* 90(9):1833-1842, 1968.

The epidemiology, incidence, clinical characteristics, diagnosis, and treatment of epidemic viral hepatitis (Botkin's disease) are discussed on the basis of 78 cases seen in a 3-yr period. The disease affects mainly children of school age, with 42 of 78 between the ages of 6 and 12, and is rare in summer (only 4 cases in July-September). The virus is ubiquitous and is spread by contact and via the feces, as a result of which the cases are concentrated within families and schools. A preicteric stage of 3-10 days, characterized by asthenia, fever, nausea, vomiting, anorexia, and abdominal pain, but sometimes lacking all of these symptoms, is followed by recovery in about 3 weeks. The most reliable tests for diagnostic purposes are those relating to cytolysis, including increases in serum transaminases, ornithine-carbamyl-transferase and iron; other findings include increased erythrocyte sedimentation rate, hypergammaglobulinemia, disturbances in flocculation tests (e.g., MacLagan), and variable leukopenia and hyperbilirubinemia. The disease is almost always benign, although post-hepatic cirrhosis presents a danger in the newborn. Treatment consists mainly of rest, proper diet, and vitamins, corticosteroids usually being superfluous. Administration of gamma-globulin for prophylaxis is discouraged, except in special cases, since it merely serves to increase the number of occult forms.

1616 PROTEOLYTIC ACTIVITY OF THE BLOOD IN THE COURSE OF VIRAL HEPATITIS. *(Pol.)* Kajzer, J. (Miejski Hosp., Mikolow, Poland). *Pol. Tyg. Lek.* 23(20):736-739, 1968.

Comparative determinations of the proteolytic activity of the blood (increase in nonprotein nitrogen during 24 hours' incubation at 37C following hemolysis and treatment with chloroform) in 94 patients (47 children, 3-14 yr old, and 47 women, 18-58 yr old) in the first week of uncomplicated viral hepatitis, 39 patients (5 children and 34 women, 16-67 yr old) with hepatitis complicated by kidney disease or severe infection, and 23 healthy controls (4-60 yr old) showed that the proteolytic activity decreases markedly (to 5.7 mg% nonprotein nitrogen per 24 hr compared to 34.3 in controls) during the initial stage of jaundice. No such increase was observed in the patients with complicated hepatitis, although the nonprotein nitrogen was also elevated in these patients (62.4 mg% compared to 35.8 mg% in controls and 66.6 mg% in patients with uncomplicated hepatitis). Repeat determinations in 53 of the first group and 23 of the second group of patients revealed a slow increase in proteolytic activity, reaching normal values while the nonprotein nitrogen was still elevated but after the serum bilirubin had decreased. The proteolytic activity was found to be localized to the red blood cells. Studies of the serum proteins in 10 patients revealed a parallel decrease in serum albumin during the initial phase of jaundice, but no clear relationship between the proteolytic activity and the other liver function tests. The mechanism of these changes in proteolytic activity remains unknown.

1617 INCIDENCE OF INFECTIOUS HEPATITIS IN RELATION TO THE ABO BLOOD TYPE AND RHESUS FACTOR. *(Rom.)* Vîţă, A. (Inst. Med. Pharm., Iaşi, Romania), T. Wexler, P. Pruteanu, M. Ulianov, G. Cuciureanu, T. Hurmuzache and T. Schwartzenberg. *Rev. Medicochir. Iasi* 71(4):941-947, 1967.

The ABO blood group and Rh factor distribution among 200 adults and children treated for viral hepatitis in 1960 was not significantly different from that among controls (912 children with other diseases and groups of healthy subjects from Moldavia and from the area of Iaşi): 34.5 and 32.72-33.1% O, 43.5 and 41.01-41.9% A, 14.0 and 17.19-17.76% B, and 8.0 and 7.7-8.44% AB, resp. Among 132 children treated for viral hepatitis in 1965, however, there was a significantly higher percentage with blood group O (44.7%) and reduced numbers with blood groups B (11.4%) and AB (4.5%), while the percentage with blood type A (39.4%) was about normal. Also, 19% of the children with hepatitis were Rh-negative compared to 12% of controls. When the two groups of hepatitis patients were considered together, the overall ABO blood group distribution was not significantly different from that in controls (37.3% O, 42.9% A, 13.3% B and 6.5% AB), but the milder cases again showed a higher frequency of blood type O (43.1% O, 40.4% A, 9.2% B and 7.3% AB) while the severe cases showed a higher frequency of blood type A (32.8% O, 50.0% A, 10.3% B and 6.6% AB). No explanation is offered for the apparent association between blood type A and more severe forms of viral hepatitis.

1618 CONSIDERATIONS ON THE MECHANISM OF DIRECT HYPERBILIRUBINEMIA IN ICTERIGENIC EPIDEMIC HEPATITIS. *(Rom.)* Dragomirescu, M. (Infect. Dis. Clin., Timişoara Med. Inst., Romania). *Med. Intern. (Bucur.)* 20(3):337-347, 1968.

In experiments with guinea pig liver slices incubated in Krebs-Ringer phosphate buffer plus glucose at 37C, addition of normal human gallbladder bile increased the oxygen consumption from 4.90 to 7.28 microliters per 100 mg of liver tissue per minute. The bilirubin recoverable after incubation of buffered human bile fell from 1.44 mg% in control flasks to 0.88 mg% in the presence of guinea pig liver and 0.22 mg% with the addition of liver tissue and ATP. The absorption of bilirubin by liver slices *in vitro,* which is apparently an energy-requiring process, could also be demonstrated histochemically. Studies of the serum bilirubin and biliary bilirubin excretion in 28 patients (17 with icterigenic and 11 with cholestatic viral hepatitis) revealed no relation between the two parameters in the icterigenic type of hepatitis. Thus, in the patients with icterigenic hepatitis, the direct serum bilirubin was 59-64.5% regardless of the biliary bilirubin excretion, while in patients with cholestatic hepatitis the direct serum bilirubin fell from 79 to 57% as the biliary bilirubin excretion increased from 0.1-0.5 to 5-10 (normal = 14-28). Liver biopsy and staining for bilirubin by the method of Stein revealed frequent canalicular dilatation and thrombosis in the patients with cholestatic hepatitis, but in the icterigenic group there was no canalicular dilatation, cholestasis or cholethrombosis, the bilirubin density decreased in areas of necrosis, and there was marked intracellular granularity. On the basis of these findings and an introductory review of the possible mechanisms of hyperbilirubinemia, it is suggested that this could be produced by disturbances in bilirubin secretion in the absence of any cytolysis or cholethrombosis.

1619 **THE RADIOLOGICAL STUDY OF THE SMALL INTESTINE IN CHRONIC HEPATITIS (CONSIDERATIONS ON 45 CASES).** *(Rom.)* Lungeanu, M. (Dr. I. Cantacuzino Hosp., Bucharest, Romania) and E. Ilie. *Med. Intern. (Bucur.)* 20(3):349-353, 1968.

The clinical, pathological and radiological findings in the small intestine were compared in 45 patients with chronic hepatitis, 19 of whom also had secondary anemia and 15 of whom complained of severe duodenobiliary dyspepsia. Radiology revealed functional changes in the small intestine in 12 cases, 7 of whom had secondary anemia (compared to 12 cases of secondary anemia among the 33 without radiological changes in the small intestine), but there was no correlation between the radiological findings and the duration of hepatitis (4-10 yr, average 6 yr, in the 12 cases with small intestinal pathology) or other clinical and laboratory findings. Among the 12 cases with positive radiological findings, 3 had increased tone, 2 had decreased tone, one showed intestinal dystonia, 6 had abnormalities in the small intestinal mucosa, and 2 had disturbances in intestinal transit. It is suggested that radiology of the small intestine may be useful in the diagnosis of the dyspeptic disturbances accompanying chronic hepatitis.

1620 **RELAPSES AS A CRITERION OF APPRAISAL OF THE STATE OF IMMUNITY IN VIRAL HEPATITIS.** *(Rum.)* Constantinescu, N., C. Zavate, I. Micu, R. Vasoiu, G. Virna, I. Buzdugan and A. Mihail. *Stud. Cercet. Inframicrobiol.* 19(1):3-8, 1968.

1621 **EXCHANGE TRANSFUSION IN LIVER COMA FOR VIRAL HEPATITIS.** *(Sp.)* Beker, G., S. (Med. Fac., Cen. U. Venezuela, Caracas), V. Lecuna T., M. De Gonzalez and J. Valencia-Parparcen. *G.E.N.* 22(2):117-126, 1967.

1622 **EXCHANGE TRANSFUSION IN THE TREATMENT OF HEPATIC COMA. [THREE CASES]** *(E.)* Zacarías, J. S. (Hernando de Aguirre 2142, Santiago, Chile), P. Brinck and J. G. Huidobro. *J. Pediat.* 71(5):660-664, 1967.

1623 **THE EPIDEMIOLOGY, VIROLOGY AND PROPHYLAXIS OF VIRAL HEPATITIS.** *(Rev.)(Fr.)* Cachin, M. (Cochin Hosp., Paris, France). *Presse Med.* 76(13):619-622, 1968.

1624 **HEPATITIS: TRANSMISSION AND PROPHYLACTIC MEASURES.** *(Rev.)(E.)* Badreldin, A. (Med. Corps, United Arab Republic). *Rev. Int. Serv. Sante* 40(12):867-869, 1967.

1625 **THE CONSEQUENCES OF EPIDEMIC HEPATITIS. A TWO-YEAR STUDY OF 200 CASES.** *(Rum.)* Zamfirescu, I. (1st Infect. Dis. Clin., Colentina, Rumania), St. Dediu, L. Paun, I. Dancu, C. Isbasescu, N. Istodor and R. Vlad. *Med. Intern.* 20(1):73-80, 1968.

1626 **AUTOIMMUNE PROCESSES IN THE DEVELOPMENT OF VIRAL HEPATITIS.** *(Rev.)(Pol.)* Kowalczyk, M. (Infect. Dis. Clin., Acad. Med., Warsaw, Poland). *Pol. Arch. Med. Wewnet.* 40(3):385-390, 1968.

1627 **SERUM IMMUNOGLOBULIN LEVELS IN BLOOD DONORS IMPLICATED IN TRANSMISSION OF HEPATITIS.** *(E.)* Bevan, G. (Mayo Clin., Rochester, Minn.), H. F. Taswell and G. J. Gleich. *J.A.M.A.* 203(1):38-40, 1968.

1628 **THE TRANSMISSION OF HEPATITIS: A STUDY OF PROPHYLACTIC MEASURES.** *(Rev.)* *(Fr.)* Gomez Sigler, J. *Rev. Int. Serv. Sante Armees* 41(2): 103-108, 1968.

1629 **VIEWS ON THE METHODS OF TRANSMISSION AND THE PROPHYLAXIS OF EPIDEMIC HEPATITIS.** *(Rev.)(Fr.)* Mares, E. *Rev. Int. Serv. Sante Armees* 41(2):111-116, 1968.

1630 **VIRAL HEPATITIS: AN UNCONQUERED FOE.** *(E.)* Hillis, W. D. (Johns Hopkins U. Sch. Hyg. Publ. Health, Baltimore, Md.). *Milit. Med.* 133(5):343-354, 1968.

1631 **EPIDEMIC OF VIRAL HEPATITIS OBSERVED IN NOVEMBER OF 1963 AT THE AERONAUTICAL ACADEMY.** *(Fr.)* D'Ambrosio, G. (Milit. Hosp., Naples, Italy). *Rev. Int. Serv. Sante Armees* 41(2):119-121, 1968.

1632 **FOCAL ACIDOPHILIC NECROSES OF HEPATIC AND KUPFFER'S CELLS IN EARLY EPIDEMIC HEPATITIS.** *(Rus.)* Shumkina, O. B. (D. I. Ivanovskii Inst. Virusol. Acad. Med. Sci. USSR, Moscow). *Arkh. Pat.* 30(1): 25-27, 1968.

See also abstract nos.: 927,954,1530

1633 THIOACETAMIDE RESEARCH IN DOGS: I. HEPATIC CIRRHOSIS.

(E.) Rodriguez-Olleros, A. (Sch. Pharm., U. Puerto Rico, Santurce), J. E. Taveras and A. A. Delanoy. *Scand. J. Gastroent.* 3(1):65-75, 1968.

Thioacetamide toxicity was studied in dogs given 3 dose levels on a continuing basis. A dose of 25 mg/kg proved to be too toxic. A dose of 25 mg/kg on alternate days led to the production of hepatic necrosis, usually of the portal type, within 20-30 days. Six of the 9 dogs which received this dose died in the stage of necrosis. The other three survived 3-4 months and developed hypertrophic cirrhosis with portal hypertension and ascites. Three dogs received 500 mg of thioacetamide twice a week. One died on the thirty-second day. The other two survived five and six months and developed atrophic cirrhosis of the Laennec type with abundant ascites.

1634 A CASE OF OPERATED FOCAL NODULAR CIRRHOSIS OF THE LIVER.

(E.) Aronsen, K. F. (Malmo Gen. Hosp., Sweden), A. Lunderquist, O. Malmborg and J. G. Nordén. *Scand. J. Gastroent.* 3(1):58-64, 1968.

The case is presented of a 23-yr-old slaughterhouse assistant who was admitted for study after he had sustained a blow against the left lower side of his chest while playing ice hockey. Celiac angiography unexpectedly revealed a very vascular liver tumor. Both pre- and postoperative liver blood flow studies showed intrahepatic shunting of blood. Eight days after operative treatment of the focal nodular cirrhosis previously abnormal liver function tests were normal.

1635 THE CAUSE OF HYPERVENTILATION AND ARTERIAL HYPOXIA IN PATIENTS WITH CIRRHOSIS OF THE LIVER.

(E.) Karetzky, M. S. (Mary Imogene Bassett Hosp., Cooperstown, N. Y.) and J. C. Mithoefer. *Amer. J. Med. Sci.* 254(6):797-804, 1967.

The ventilatory response to CO_2 in 7 patients (4 men and 3 women, 54-74 yr old) with alcoholic cirrhosis of the liver and hyperventilation, but free of cardiopulmonary disease, was found to be augmented in the range $pCO_2 = 30\text{-}40$ mm Hg, after which the response decreased. This suggests diminished tolerance to CO_2, ascribed to coexisting intracellular acidosis, as the cause of the hyperventilation. A study of the relationship between inspired O_2 pressure and the alveolar-arterial O_2 pressure difference in 6 of the 7 patients revealed an increased gradient at inspired O_2 pressures from 80 to 700 mm Hg. The calculated venous admixture was elevated to 11% (normal 3%), indicating that an abnormality in $\dot{V}_A/\dot{Q}$ contributes, along with arteriovenous shunting, to the arterial hypoxia in these patients.

1636 RENAL FAILURE IN PATIENTS WITH CIRRHOSIS OF THE LIVER. III. EVALUATION OF INTRARENAL BLOOD FLOW BY PARA-AMINOHIPPURATE EXTRACTION AND RESPONSE TO ANGIOTENSIN.

(E.) Schroeder, E. T. (State U. New York, Upstate Med. Ctr., Syracuse), L. Shear, S. M. Sancetta and G. J. Gabuzda. *Amer. J. Med.* 43(6):887-896, 1967.

The impairment of renal function associated with advanced hepatic cirrhosis was investigated by means of the p-aminohippurate (PAH) extraction ratio in 22 patients (17 men and 5 women, 31-58 yr old) with Laennec's cirrhosis (21 cases) or bile duct carcinoma with secondary biliary cirrhosis (1 case). Ascites was present in all cases, and in 12 cases the cirrhosis was far advanced. Among the 21 patients with Laennec's cirrhosis, 4 also had fatty livers and 2 of these also had alcoholic hepatitis. Five of the 22 patients, including the one with bile duct cancer, showed early renal failure (mildly elevated uremia and serum creatinine), and all died within 3 months, 3 in hepatic coma and 2 of massive gastrointestinal hemorrhage. The PAH extraction ratio was below normal during control periods in 8 of the 22 cases, including all 5 with renal failure. This impairment in renal tubular PAH transport was associated with but apparently not due to decreased renal plasma flow and glomerular filtration rate and a poor urine flow response to water administration. Chronic renal disease, tubular necrosis, renal hypoxia, excessive tubular load of PAH or low urine flow rate could not be incriminated. Among 10 patients given a PAH load, 5 responded normally and 5 showed changes in PAH extraction consistent with impairment of renal tubular PAH transport. Among 8 patients given i.v. infusions of angiotensin, one responded normally with reductions in renal blood flow and glomerular filtration rate, 4 responded with natriuresis and diuresis as expected for cirrhotic patients, and 3 (these being among the 8 with an abnormal PAH extraction ratio) showed little or no change in renal function; none of the 8 showed any change in PAH extraction during angiotensin infusion. It is concluded that the changes in renal function noted in some patients with cirrhosis are best explained by a hemodynamic alteration involving renal cortical vasoconstriction with a relative increase in medullary blood flow.

1637 RESEARCHES ON PLASMA, BILE, HEPATIC TISSUE LIPIDS IN HUMAN LIVER CIRRHOSIS.

(E.) Vecchi, G. P. (Inst. Gen. Clin. Med., U. Modena, Italy) and G. F. Salvioli. *G. Arterioscler.* 5(6):617-624, 1967.

A comparative study of the lipid composition of the bile, serum, and hepatic tissue in 5 normal subjects, 6 patients with Morgagni-Laennec atrophic cirrhosis, and 3 patients with biliary cirrhosis revealed marked differences, which are of apparent etiological significance and may be useful in differential diagnosis. Thus, while patients with biliary cirrhosis showed increased levels of cholesterol, triglycerides, and free fatty acids in the serum, hepatic bile, and gallbladder bile, the triglyceride and free fatty acid levels were decreased in all 3 areas in patients with Morgagni-Laennec cirrhosis, and the cholesterol was increased only in the hepatic bile (decreases in serum and gallbladder bile compared to normal levels). Patients with Morgagni-Laennec cirrhosis also showed a relative decrease in linoleic and arachidonic acid and an increase in oleic acid in the serum and bile, while patients with biliary cirrhosis showed a relative increase in the content of palmitoleic acid. In normal hepatic tissue, the cholesterol esters had less linoleic acid and the phospholipids had more arachidonic acid than in the serum. This was also generally true of hepatic tissue from patients with biliary cirrhosis. In those with Morgagni-Laennec cirrhosis, however, the hepatic tissue (like the serum and bile) showed a significant decrease in polyunsaturated fatty acids. Since hyperfunction of the reticuloendothelial system is characteristic of both types of cirrhosis, it cannot be responsible for the above differences in lipid composition, which are ascribed to specific differences in factors such as lipid uptake, transport, and biliary secretion.

1638 PROTEIN NUTRITION IN LIVER CIRRHOSIS IN THE LIGHT OF NITROGEN BALANCE STUDIES. *(Pol.)* Roguski, J. (2nd Int. Dis. Clin., Acad. Med., Poznan, Poland), M. Ruszkowski, L. Hryniewiecki, J. Hasik, K. Makowska and T. Grala. *Pol. Arch. Med. Wewn.* 40(1): 101-110, 1968.

Nitrogen balance studies were carried out in 12 patients (8 men and 4 women, 36-63 yr old) with postnecrotic and portal cirrhosis who were given a normal-caloric diet providing a fat intake of no more than 1.0 g/kg/day and a varying protein intake. The minimal amount of protein required to maintain nitrogen balance was found to be 0.62 ± 0.15 g/kg/day in patients with compensated cirrhosis and somewhat more (0.80 ± 13 g/kg/day) in patients with uncompensated cirrhosis. On the other hand, the former group tolerated high-protein diets providing as much as 1.5 g/kg/day, while in patients with uncompensated cirrhosis a protein intake of more than 1.0 g/kg/day was accompanied by hepatic precoma and increases in arterial ammonia and the arteriovenous ammonia difference. A direct correlation could be established between the nitrogen excretion and the protein intake, especially in patients with compensated cirrhosis. Diets providing a high-value protein intake of 1.0-1.5 g/kg/day are recommended for patients with compensated cirrhosis, while in advanced cases, the protein intake should be reduced to 0.8 g/kg/day.

1639 ORNITHINE-CARBAMYL TRANSFERASE ACTIVITY IN CASES OF LIVER CIRRHOSIS. *(Pol.)* Ignatowska-Switalska, H. (2nd Int. Dis. Clin., Acad. Med., Warsaw, Poland) and T. Wasowska-Ciszek. *Pol. Arch. Med. Wewn.* 40(2):191-195, 1968.

The serum ornithine-carbamyl transferase activity was determined in 30 patients (16-73 yr old) with cirrhosis of the liver (including 10 with postnecrotic cirrhosis, 5 with alcoholic cirrhosis, and 2 with biliary cirrhosis) and in 25 apparently healthy controls (16-64 yr old). While the mean ornithine-carbamyl transferase activity in the controls was about 6.0 IU, the value was significantly higher in cirrhotics (5-26 IU, with a mean of 14.0 ± 6.8). The highest values were obtained in necrotic cirrhosis (mean 17.6 IU), while patients with alcoholic cirrhosis showed a mean value of only 8.4; among the entire group of 30 patients, 25 had values higher than the normal mean, while 12 had values higher than 24 of the 25 controls, and 8 patients had values higher than any of the controls. There was no correlation between ornithine-carbamyl transferase activity and the activity of lactic dehydrogenase, aspartic aminotransferase, or alanine aminotransferase, which were elevated in 50%, 40%, and 23% of the patients, resp.

1640 METABOLISM OF ZINC-65 IN CIRRHOSIS. *(E.)* Kahn, A. M. (UCLA Sch. Med., Los Angeles, Calif.), J. G. Rizer, R. B. Thomas and H. E. Gordon. *Surgery* 63(4):678-682, 1968.

Metabolism, organ uptake, gastrointestinal absorption, and urinary excretion of ^{65}Zn were studied in 10 albino rats with carbon tetrachloride-induced cirrhosis and in 29 healthy controls. Liver ^{65}Zn uptake was significantly higher in the cirrhotic rats, suggesting a zinc deficiency in cirrhosis; serum and spleen uptakes were significantly lower in the cirrhotic rats than in the controls. There was no significant difference between the two groups in gastrointestinal absorption or urinary excretion of ^{65}Zn.

1641 STARVATION AND CIRRHOSIS OF THE LIVER (OBSERVATIONS ON FORMER PRISONERS OF WAR). *(Pol.)* Japa, J. (1st Clin. Int. Dis., Silesian Acad. Med., Katowice, Poland), M. Machalski and H. Sikora. *Pol. Arch. Med. Wewnet.* 40(1):55-61, 1968.

Among 205 patients (142 men and 63 women) treated for portal cirrhosis during the period 1951-65, 25% (42 men and 10 women) had undergone severe starvation in prisons and concentration camps during World War II. Alcohol was responsible for another 55 cases (54 men), 11 were due to syphilis, malaria or poisoning with benzene or cinchophen, and in 87 cases the etiology was unknown. Cirrhosis usually developed 10-20 yr after the period of starvation (in 32 of 52 cases), and was proportional in severity to the loss of body weight and the extent of edema; there was no correlation, however, between the severity of cirrhosis and the duration of starvation (6-12 months in 10 of 52, 1-3 yr in 21, and more than 3 yr in 21). Nineteen cases were compensated (mild), and in this group only 3 patients had had a weight loss of more than 20 kg and only 10 had had edema. Fourteen cases were uncompensated and 19 patients had died; of these 19, 14 had had a weight loss of more than 20 kg and all had had edema. The clinical signs and symptoms of cirrhosis due to starvation and due to alcoholism were similar, as were the laboratory findings in the two groups, although those with a history of starvation had more hepatomegaly and hypersplenism and lower values for serum proteins, cholesterol and blood pressure. Survival time was somewhat shorter in alcoholic cirrhosis (23 of 55 had died, 21 of 23 in 1-3 yr, compared to 12 of the 19 deaths in the starved group).

1642 THORACIC DUCT CANNULATION IN THE MANAGEMENT OF PORTAL HYPERTENSION. *(E.)* Bhalerao, R. A. (K. E. M. Hosp., Parel, Bombay, India), S. R. Panday, M. D. Kelkar, S. R. Karmarkar and P. K. Sen. *Indian J. Surg.* 29(10):525-533, 1967.

The 21 cases of portal hypertension treated by thoracic duct cannulation included 18 patients with cirrhosis and 3 with normal livers (1 with a portal cavernoma and 2 with primary portal hypertension). Bleeding esophageal varices were present in 13 cases, 11 of which also had ascites and jaundice. Cannulation of the thoracic duct with a siliconized, flexible PVC cannula (internal diameter 1.7-2.0 mm), which was left in place for from 3 hr to 7 days with return of the heparinized lymph to the patient's circulation, resulted in decreased thoracic duct pressure and intrasplenic pressure, decreased hepatosplenomegaly and decreased ascites (probably due to a decrease in hepatic sinusoidal pressure). The lymph flow was 1.5-7.0 ml/min. Variceal bleeding stopped entirely in 7 cases and decreased in 4, although most of these patients still died of hepatic coma. In 6 of the 21 cases, no definitive procedure was possible and all died within a week. Twelve patients subsequently had an end-to-side portacaval shunt (an operation which was greatly facilitated by the prior cannulation); 8 of these nevertheless died and 4 survived (including 2 with cirrhosis and 2 with primary portal hypertension). Two other cirrhotics died, one after ligation of bleeding varices and one after lienorenal shunt (acute pancreatitis), while the one patient with hepatic cavernoma survived following splenectomy and gastric transection. Hepatic failure accounted for 14 of the 16 deaths. Studies of the 5 survivors showed no ill effects and satisfactory lymphatic drainage. Thus, while short-term cannulation cannot prolong life by itself, it has no ill effect and results in desirable portal decompression and decreased ascites which can facilitate subsequent surgery. Some type of definitive surgery should be performed in every suitable case, and a permanent lymphovenous anastomosis in the neck is suggested as one possible curative procedure.

1643 MEGALOBLASTIC ANEMIA POSSIBLY INDUCED BY TRIAMTERENE IN PATIENTS WITH ALCOHOLIC CIRRHOSIS: TWO CASE REPORTS. *(E.)* Lieberman, F. L. (U. South. California Sch. Med., Los Angeles) and J. R. Bateman. *Ann. Int. Med.* 68(1):168-173, 1968.

1644 THE ACANTHOCYTE IN CIRRHOSIS WITH HEMOLYTIC ANEMIA. [CASE REPORT] *(E.)* Douglass, C. C. (U. Texas Southwest. Med. Sch., Dallas M. S. McCall and E. P. Frenkel. *Ann. Int. Med.* 68(2):390-397, 1968.

1645 CLINICAL SIGNIFICANCE OF ESOPHAGEAL VARICES. *(E.)* Palmer, E. D. (Vet. Admin. Hosp., East Orange, New Jersey). *Med. Rec. Ann.* 61(2):66-68, 1968.

See also abstract nos.: 1034,1035,1036,1530,1646

1646 SERUM CERULOPLASMIN IN OBSTRUCTIVE JAUNDICE.

(E.) Hauftová, D. (1st Med. Clinic, Palacky U., Olomouc, Czechoslovakia), J. Slavíček and J. Fialová. *Gastroenterologia* 108(6):317-323, 1967.

Serum ceruloplasmin level was increased in 51 patients with obstructive jaundice (0.67 U) compared to values in healthy controls (0.45). One week after the onset of the disease, the same serum ceruloplasmin values were obtained in obstructive jaundice and in viral hepatitis (0.68). The values of serum ceruloplasmin in obstructive jaundice of malignant etiology (0.69) did not differ from those in obstructive jaundice of benign etiology (0.66). There was no statistically significant correlation between ceruloplasmin and alkaline phosphatase, bilirubin and all the blood proteins in the serum with the exception of gamma globulins. The correlation between serum ceruloplasmin and serum copper levels was statistically significant. While 17 patients with viral hepatitis and 17 with obstructive jaundice had identical ceruloplasmin values, the jaundice patients had significantly increased levels of serum copper (195 compared to 140 μg%). In contrast to serum copper, serum levels of ceruloplasmin cannot be used to differentiate obstructive jaundice from viral hepatitis.

1647 A QUANTITATIVE STUDY OF THE PROTEINS IN HUMAN BILE UNDER NORMAL AND PATHOLOGICAL CONDITIONS.

(Fr.) Arianoff, A. A. (St. Elisabeth Clin., Brussels, Belgium) and J. Heremans. *Acta Gastroent. Belg.* 30(5/6):387-406, 1967.

Quantitative analysis of 24 samples of choledochal bile, using a modified Birthe-Tidström colorimetric technique, showed that the normal protein content is about 0.7 g/liter. This is increased in pancreatitis or inflammation of the bile duct, and may be decreased in viral hepatitis (one case). In bile from the gallbladder, the normal protein content (10 cases) is 2.6 g/liter. This is increased moderately (to 3.3-4.4 g/liter) in cholecystosis or cholelithiasis (122 cases), and more markedly in cholecystitis (19 cases), where there seems to be a correlation between the protein content and the severity of the infection. Thus, the average protein content was 9.1 g/liter in subacute cholecystitis, 16.1 g/liter in villous hyperplastic cholecystitis, and 39.9 g/liter in purulent cholecystitis. The highest protein levels were reached in limy bile (43.3 g/liter in 8 cases), while in hydrops or hepatitis the values were below normal (2.1 g/liter). There was no correlation, in these samples, between the protein content and that of potassium, chloride or cholesterol. In fact, the protein content of the bile was usually normal in cases with cholesterol stones, being elevated in direct proportion to the content of bile pigments; however, in cases with calcified cholesterol stones, the levels of protein, cholesterol and bile salts were all quite high.

1648 A STUDY OF THE COMPOSITION OF HUMAN BILE UNDER NORMAL AND PATHOLOGICAL CONDITIONS. PART III. BACTERIOLOGY, BILIARY SEDIMENT, VESICULAR CONCENTRATION, pH, AMYLASES, BILIRUBIN AND PHOSPHOLIPIDS.

(Fr.) Arianoff, A. A. (St. Elisabeth Clin., Brussels, Belgium). *Acta Gastroent. Belg.* 30(7):469-504, 1967.

Bacteriological studies on 137 samples of bile yielded positive cultures in 13 of 59 cases of cholelithiasis, 11 of 41 cases of mixed cholelithiasis and cholecystosis, and 1 of 37 cases of pure cholecystosis; *Escherichia coli* or coliform organisms accounted for 16 of the cases. There was no apparent relation between the incidence of infection and the concentration of bile salts. Examination of the biliary sediment in 49 cases (17 with cholelithiasis, 14 with mixed forms, 16 with cholecystosis and 2 normals) showed increased amounts of mucin, desquamating cells, bile salts and droplets of neutral fat in all 3 conditions, but especially in cholecystosis; cholelithiasis was accompanied by larger numbers of WBC and RBC. The pH was found to be about 7.0 in both choledochal bile and vesicular bile, although it drops slightly during concentration by the gallbladder; there was no significant correlation between the pH and disease. A comparison of the chemical composition of the bile before and after concentration in the gallbladder in 9 subjects, as well as the average data on hepatic and vesicular bile from 20 and 139 subjects, resp., indicated that the concentration of bile salts is increased in the gallbladder about 3.5-fold, that of cholesterol about 3-fold, and that of bilirubin, calcium and potassium about 1.5-fold, while the chloride concentration drops to about 70% of its initial value. Determinations of biliary amylase by the method of Wohlgemuth in 354 samples of vesicular bile and 11 of choledochal bile showed values above 128 U in 45.4% of patients with cholecystosis, compared to 28.7% in cholelithiasis and 24.6% in mixed forms. In 10 samples of normal vesicular bile, the average bilirubin content was 0.717 g/liter, compared to 0.610 g/liter (range 0.14-1.2 g/liter) in 12 samples of choledochal bile; the bilirubin content of vesicular bile was increased (to 1.1-1.2 g/liter) in cholelithiasis or cholecystosis, and decreased (to 0.186 g/liter) in hydrops. The phospholipid content of normal vesicular bile was found to average 130.22 mg% P/ml (range 42.25-205.88); comparable values (120-123 mg% P/ml) were obtained in cholecystosis or mixed forms, but in cholelithiasis the average was only 74.8 mg% P/ml (range 14.03-243.22) and in hydrops phospholipids were practically absent from the bile.

1649 THE PROBLEM OF THE QUANTITATIVE BACTERIOLOGICAL EXAMINATION OF BILE.

(Ger.) Seidel, K. (Med. Clin., Friedrich Schiller U., Jena, Germany), A. Stelzner, G. Stein, H. Brunnemann and H. Oehring. *Deutsch. Zschr. Verdau. Stoffwechselkr.* 27(3/4):103-108, 1967.

The application of quantitative plating techniques to samples of both hepatic and vesicular bile obtained under sterile conditions by duodenal catheter in 104 patients (39 men and 65 women, 18-75 yr old) with various diseases showed a statistically increase in the number of bacteria in patients with clinical signs of cholecystitis or cholangiitis. Taking a count of 1 x 10^5/ml as the upper limit of normal, values higher than this were obtained in only 6 of 58 patients with gastrointestinal disease (ulcers, colitis), hepatitis, prior cholecystectomy without signs of inflammation, or diseases not involving the intestinal tract, but in 4 of 4 patients with a negative gallbladder reflex, 22 of 39 cases of cholecystitis or cholangiitis, and 3 of 3 patients with inflammation following cholecystectomy. In 31 of this latter group of 46 cases, positive cultures were obtained from both the hepatic and the vesicular bile. Sterile bile was obtained from 27 of the first group of 58 patients and from one of the 39 cases of cholecystitis or cholangiitis. Among the 46 cases with a high incidence of positive findings, 31 had a mixed flora while 14 yielded only a single bacterial species. The most common species isolated were *Staphylococcus albus, Proteus vulgaris, Escherichia coli, Enterococcus, Aerobacter* and *Candida albicans.* There was no significant relationship between the bacteriological findings and the pH of the bile or the gastric secretion. Quantitative culture of the bile is recommended as a valuable supplemental technique in the diagnosis of chronic cholecystitis.

1650 GLANDULAR HYPERPLASIA AND DYSPLASIA OF THE CHOLECYSTIC MUCOSA WITH PARTICULAR REFERENCE TO CHOLELITHIASIS AND CARCINOMA OF THE GALLBLADDER. *(It.)* Properzi, A. (S. Salvatore Civil Hosp., L'Aquila, Italy) and T. Ventura. *Chir. Gastroent.* 2(1):35-46, 1968.

Routine histological examination of 214 gallbladders (including 212 with stones) removed from 48 men and 166 women (most 30-60 yr old) during 1962-65 revealed 95 (from 20 men and 75 women, including 94 with stones and 85 with cholecystitis) with unusual hyperplastic and dysplastic changes affecting the mucosa and pseudoglandular diverticuli; in two cases the changes had progressed to adenocarcinoma, with involvement of the lymphatic follicles. The largest number (72 cases) showed extensive hyperplasia of the normal elements of the gallbladder mucosa, with an increase in number and intraparietal elongation of the pseudoglandular diverticuli, either ectatic or reaching the subserosa; in some cases, with or without concomitant inflammation, this had led to the development of cysts. Another 21 cases showed metaplasia and dysplasia of the gallbladder mucosa, with tubulo-acinar adenomatosis, nuclear atypism, and small-cell infiltration of the connective tissue; in some cases this had led to the appearance of structures resembling Brunner glands, and one case showed localized transformation to an intestinal type of mucosa. These changes in the gallbladder wall are ascribed to prolonged contact, due to cholestasis, with chemical or hormonal agents, probably the metabolites of cholesterol with the steroid hormones.

1651 GENERAL CONCEPTS OF THE UP-TO-DATE SURGICAL TREATMENT OF CHOLELITHIASIS. *(Fr.)* Roux, M. (Vaugirard Hosp., Paris, France) and P. Vayre. *Chir. Gastroent.* 2(1):22-34, 1968.

In a general review of their experience with the surgical treatment of cholelithiasis, the authors emphasize the importance of pre- and peroperative cholangiography and radiomanometry in providing data as to the condition of the common bile duct, data on which the procedure to be followed depends heavily. Among the variables to be considered before the choice of an operation are the diameter of the common bile duct, the presence or absence of stones in the duct, and the presence of hyper- or hypotension of the sphincter of Oddi. In most operations, even a simple cholecystectomy for cholecystitis, the final outcome will be determined by the hydrodynamic conditions within the common bile duct. Separate attention is then given to the surgical treatment of uncomplicated vesicular stones (retrograde cholecystectomy is preferred), acute cholecystitis, and common duct stones. In acute cholecystitis, rapid surgery is recommended, before the onset of the regional inflammatory sclerosis which usually develops after about the 10th day and renders any type of biliary surgery extremely dangerous. The procedure for common duct stones is affected by the presence or absence of chronic cholecystitis and the size of the stones, as well as by the condition of the sphincter of Oddi; frequently, these stones are accompanied by inflammation of the sphincter, either a reversible inflammation which can be treated by simple external drainage, or a chronic sclerodystrophic papillitis necessitating sphincterotomy or even bilio-digestive anastomosis in addition to removal of the stones. Among 293 cases of common duct stones treated by the authors, 102 were helped by simple extraction followed by drainage, 152 received sphincterotomy, and 39 received choledocho-duodenostomy. The overall cure rate for cholelithiasis surgery is now 90%. The mortality varies from 1.5% for patients with chronic cholecystitis to 5.2% for acute cholecystitis, 7.5% for common duct stones, and 10% for reinterventions.

1652 CONTRIBUTION TO THE STUDY OF INTERNAL AND EXTERNAL BILIARY FISTULAE. *(It.)* Bellucci, M. (Inst. Gen. Clin. Surg., U. Perugia, Italy) and B. Tristaino. *Ann. Med. Perugia* 58(3):441-468, 1967.

The etiology, diagnosis and treatment of biliary fistula are discussed on the basis of 25 personal cases (10 external and 15 internal) and a detailed review of the literature (41 refs.). From the point of view of etiology, all biliary fistulae can be divided into spontaneous fistulae and those of traumatic origin, although traumatic internal fistulae are rare. The authors' 10 cases of external fistulae included 3 spontaneous fistulae due to cholecystitis or inflammation of other areas of the biliary tree, one traumatic fistula following surgery on the bile ducts, and 6 fistulae following surgery on the liver parenchyma (e.g., for echinococcal cysts). There were no cases due to surgery on the stomach or duodenum, although such have been reported in the literature. Spontaneous internal fistulae, which are usually due to underlying cholelithiasis, ulcer, biliary cancer, echinococcosis or other gastrointestinal disease, can be divided into bilio-digestive, bilio-biliary, bilio-bronchial and rarer miscellaneous types (bilio-renal, bilio-pericardial, bilio-uterine, etc.). The authors' 15 cases included 2 cholecysto-choledochal fistulae, 2 cholecysto-duodenal fistulae (one due to duodenal ulcer and one to cholelithiasis), and 11 choledocho-duodenal fistulae. The differential diagnosis of these conditions depends heavily on radiology, both cholangiography and barium-swallow or barium-enema examination of the digestive tract. The treatment is exclusively surgical. Although surgical repair is generally safe and effective, the authors emphasize the prevention of biliary fistulae by improved surgical technique, the elimination of obstacles to the flow of bile into the duodenum, and the early treatment of those diseases which can lead to fistula development.

1653 THE SERUM CHOLESTEROL LEVEL IN PATIENTS WITH CHOLELITHIASIS. *(Ger.)* Schmauss, A. K. (Friedrichshain Hosp., Berlin, Germany), N. Faber and A. Konig. *Munchen. Med. Wschr.* 110(12):710-714, 1968.

Preoperative determinations of the serum cholesterol level in 350 patients with cholelithiasis (90 men and 260 women, most 50-70 yr old) showed that the mean values were within the norma range in both sexes, increasing with age from 179-193 to 231-240 mg% and then dropping off after the age of 50 (in men) or 70 (in women). Hypercholesteremia was detected in 20.3% and hypocholesteremia in 4.5% of the cases. Chemical analysis of the gallstones after operation in 200 cases revealed a cholesterol content of more than 90% in 31; among these 31 patients, 7 had hypercholesteremia and 2 had hypocholesteremia, essentially the same findings as among the 32 patients in whom the cholesterol content of the stones was only 20-60%. These findings fail to support any relationship between hypercholesteremia and cholelithiasis. Daily determinations of the serum cholesterol following simple cholecystectomy in 53 patients (10 men and 43 women) showed a uniform decrease (by about 40-45 mg%) during the first 5 postoperative days, followed by a gradual increase.

1654 PRIMARY NEOPLASMS OF THE EXTRAHEPATIC BILE DUCTS.

(It.) Disanto, V. (Inst. Spec. Surg. Path., U. Bari, Italy), V. Ronzini and S. Ferrarese. *Acta Chir. Ital.* 23(5):513-544, 1967.

Following a detailed review of the incidence, pathological anatomy, symptomatology, diagnosis, surgical treatment, and prognosis of cancer of the biliary tract (105 refs.), the authors report their own experience with 68 patients (36 men and 32 women, 18-70+ yr of age, but 53 of 68 between 50 and 70) included among the 752 patients subjected to biliary surgery during the period 1950-66. No benign biliary tumors were detected during this period. The 68 cases included 19 patients (3 men and 16 women) with cancer of the gallbladder, 6 of whom also had cholelithiasis, 31 with cancer of the papilla, 12 with cancer of the hepatic duct or common bile duct, and 6 with massive involvement of the biliary tract (unknown primary site). The sex ratio in cancer of the papilla and principal bile ducts (30 men and 13 women) was the opposite of that in cancer of the gallbladder, in agreement with what is usually reported in the literature. In most cases, the principal symptoms were abdominal pain, jaundice, fever, weight loss, dyspepsia, vomiting, and constipation, although a few had anorexia, diarrhea, pruritus, and/or melena. The diagnosis of the actual tumor site is difficult on the basis of clinical and laboratory findings, although hypotonic duodenography is a helpful procedure in cancer of the papilla. In gallbladder cancer, particularly, the symptoms were quite varied: 7 of the 19 had a history of biliary colic and dyspepsia lasting 1-4 yr, but becoming aggravated in the last 4-6 months, while 12 of 19 had only a 3-6 months' history. The duration of symptoms was typically short (3-6 months) in cancer of the principal bile ducts and cancer of the papilla (2-4 yr history in 2 cases, 1-6 months in the others), but even among the 6 patients with massive involvement of the biliary tract, 2 had a history extending back 1-4 yr. All but 8 cases of papillary cancer were so far advanced, with involvement of neighboring organs and/or metastasis to the liver and lymph nodes, that radical surgery was impossible. Among these 60 patients, which thus included all cases of gallbladder and main duct cancer, 39 received palliative surgery of various types, including biliodigestive anastomosis (23 cases), hepatodigestive anastomosis (11 cases), gastroenterostomy, cholecystostomy, and choledochotomy. Nevertheless, the survival time was less than a year in those with cancer of the papilla, less than 8 months in those with gallbladder or main duct cancer, and less than 6 months in those with massive biliary tract involvement. The 8 operable cases were treated by duodenostomy with excision of the tumor and drainage (3 cases), resection of the posterior wall of the second segment of the duodenum with reimplantation of the choledochus and duct of Wirsung, duodenopancreatectomy, or (in 1 case) gastroduodenopancreatectomy. One patient is living 2 yr postoperatively, while 6 died in 1-4 yr and 1 died 5 days after the operation. The overall operative mortality in this group was 8.8% (6 cases).

1655 SPONTANEOUS BILIODIGESTIVE FISTULAS.

(Sp.) Nazareno Pifano, F. (Antonio Maria Pineda Ctr. Hosp., Barquisimeto, Lara, Venezuela), R., Ventencourt R. and J. Bautista Saldivia. *G.E.N.* 22(2):147-154, 1967.

The incidence, etiology, clinical characteristics, radiological diagnosis, and treatment of biliodigestive fistulas are discussed on the basis of experience with 7 cases (women, 30-68 yr old) encountered during the period 1954-66. These 7 cases included 6 diagnosed during surgery among 1,435 biliary operations carried out during this period, and one diagnosed radiologically among 3,500 X-rays of the stomach and duodenum. There were 2 cases of cholecystoduodenal fistula, 3 of cholecystogastric fistula, and 1 of cholecystocolic fistula. All had prior symptoms of biliary colic, but only 1 showed signs of cholangitis. Among the 6 who were subjected to cholecystectomy and fistulectomy, 5 obtained good results, and 1 died postoperatively of bleeding esophageal varices. Spontaneous biliodigestive fistulas generally do not produce serious symptoms, so that surgery can be elective. Particular attention is paid in this review to surgical techniques in the presence of common duct stones, gastric ulcer, intestinal obstruction, or cancer.

1656 MORPHOLOGICAL EFFECTS OF EXPERIMENTAL LIGATION OF THE COMMON BILE DUCT ON THE LIVER.

(Ger.) Schroder, H. (Surg. Clin., Friedrich-Schiller U., Jena, Germany). *Zbl. Chir.* 93(4):129-134, 1968.

In Vista albino rats, ligation of the common bile duct was followed by a mortality rate of 21.5% in the first week, 22% in the second week and 25% in the third week, the leading causes of death being peritonitis, cholascos, and hemorrhage. In survivors, by the third week, the liver weight was 6.17% of the body weight, compared to 4.49% in controls. This increase in liver weight is ascribed mainly to the massive bile duct proliferation, which was accompanied by a moderate proliferation of connective tissue and focal parenchymal degeneration which involved only the epithelium. Since the liver damage increased in severity with continuation of cholestasis, rapid surgery is advised in cases of obstructive jaundice.

1657 THE CAUSES OF REINTERVENTION ON THE BILIARY TRACT.

(Ger.) Hartmann, G. (Surg. Clin., Friedrich-Schiller U., Jena, Germany) and G. Lumme. *Zbl. Chir.* 93(3):102-109, 1968.

The 1,555 biliary operations carried out in the authors' clinic in the period 1954-63 included 64 reinterventions on 54 patients (17 men and 37 women, 20-71 yr old, average age 51 yr), many of whom had been operated on for the first time more than 10 yr before. These 54 patients actually required a total of 74 reinterventions, 10 additional operations being performed elsewhere. The interval between operations varied from as short as a few hours or 26 days in some cases to a maximum of 37 yr. The principal reasons for reintervention were missed stones (20 cases, operated 2 months to 8 yr after the first operation), surgical damage to the common bile duct (11 cases), stenosis of the common bile duct (6 cases), biliary fistulas (5 cases), papillary stenosis (4 cases), and the cystic stump syndrome (3 cases). This conforms with the principal causes of reintervention cited in the literature. The operative mortality in these 64 cases was 14%, all involving patients over 50 yr of age. It is strongly suggested that intraoperative cholangiography and cholangioscopy would be helpful in avoiding many cases of reintervention on the biliary tract.

1658 EXPERIENCE IN BILIARY SURGERY: CHOLEDOCHODUODENOSTOMY. *(Sp.)* Moreno González, E. and M. Hidalgo Pascual. *Cir. Ginec. Urol.* 21(6):530-534, 1967.

The 227 patients (37 males and 190 females, 10-80 yr of age, most 30-60) with surgical diseases of the biliary tract seen at the "Gran Hospital de Beneficencia General" in the period 1961-67 included 193 cases of cholelithiasis (including 23 with stones in the common duct and 2 with stones in the hepatic duct), 29 of cholecystitis, 5 of biliary cancer, and 27 of obstructive jaundice. In 29 cases, these were associated with other lesions of neighboring organs, including gastric ulcer, jejunal diverticulum, appendicitis, carcinoma of the transverse colon, pancreatitis, pancreatic cysts, adenocarcinoma of the pancreas, perforation or carcinoma of the bladder, and diaphragmatic hernia. Total cholecystectomy was carried out in 192 of these patients (including 168 with stones and 24 with cholecystitis). In addition, 1 patient received partial cholecystectomy and mucoclasis, 2 received cholecystostomy, 20 were treated by choledochotomy for stones in the common duct, 5 received transduodenal papillotomy, and one patient with acute pancreatitis received a gastrostomy. Papillosphincterotomy was required in 18 of these patients, mostly (10 cases) for choledochal lithiasis or for odditis and papillitis, hypertension of the sphincter, or pancreatic disease. Among 45 patients who received some type of anastomosis, 38 were given a choledochoduodenostomy (side-to-side in 36 cases and end-to-side in 2); in 22 of these cases, the operation was made necessary by choledocholithiasis and enlargement of the common duct; in 6, by stenosing papillitis; in 5, by pancreatitis or pancreatic cancer; in 3, by stenosis and inflammation of the common duct; and in 2, by adenoma of the ampulla of Vater. The 36 side-to-side choledochoduodenostomies included 30 in which a longitudinal choledochotomy was combined with transverse duodenostomy, and 6 with transverse choledochotomy and longitudinal duodenostomy. In all cases, the diameter of the anastomosis was 1.5-2.5 cm, and the only complications noted were 4 cases of postoperative cholangitis. Finally, an anastomosis between the intrahepatic duct and the jejunum (using the technique of Longmire-Sandford as modified by Couinaud) was created in 2 cases of extrahepatic obstructive jaundice, a Roux-en-Y choledochojejunostomy was performed in 2 other cases, and 3 patients with carcinoma of the pancreas were treated by cholecystoduodenostomy.

1659 GALLBLADDER DISEASE IN INFANTS AND CHILDREN. *(E.)* Graivier, L. (Children's Med. Ctr., Dallas, Texas), G. W. Dorman and T. P. Votteler. *Surgery* 63(4):690-696, 1968.

Case reports of 11 children (aged 17 months to 14 yr) with gallbladder disease are presented; diagnoses included acute and chronic cholecystitis, acute perforated cholecystitis with *Salmonella typhi* infection, cystic duct stenosis, and cholelithiasis. One patient developed common bile duct stricture with obstructing periductal fibrosis after the onset of infectious hepatitis; another had congenital hepatic fibrosis, renal tubular ectasia, and common bile duct stenosis. Correct diagnosis is rare because many pediatricians and surgeons never encounter gallbladder disease in children. Gallbladder disease should be suspected more frequently and the biliary system should be investigated more often in children with unexplained abdominal pain.

1660 THE PHYSIOLOGIC BASIS OF CHOLANGIOGRAPHIC INTERPRETATION: PSEUDOCALCULUS SIGN AND PROBLEM OF DUCT SPASM. *(E.)* Beneventano, T. C. (Montefiore Hosp., New York City) and C. J. Schein. *Surgery* 63(4):673-677, 1968.

Knowledge of distal choledochal cyclicity and the variants in choledochal function are necessary for correct cholangiographic interpretations. The systolic and diastolic phases of duct contraction may simulate distal duct fibrosis, obstruction, "spasm", or stone when cholangiographically examined. A pseudocalculus meniscus at the distal end is a maximally contracted duct which appears as a filling defect. Distal duct "spasm" represents ampullary contractile activity due to the hypertensive instillation of contrast medium. Multiple films with cine cholangiomanometry are preferable for correct interpretation of morphological changes at the choledochoduodenal junction and correct estimation of duct size.

1661 MIGHT GALLSTONES AND RECURRENT PANCREATITIS HAVE A COMMON CAUSE? *(E.)* Bartlett, M. K. (Massachusetts Gen. Hosp., Boston). *Arch. Surg.* 95(6):887-891, 1967.

Postoperative symptom recurrence in 4 cholelithotomy patients led to surgical exploration of the common bile duct and pancreatic duct and the discovery of intermittent obstruction to bile and pancreatic fluid outflow due to abnormal muscle activity at the choledochoduodenal junction. Transduodenal sphincteroplasty was performed with complete symptom alleviation. Musculature malfunction at choledochoduodenal junction might provide a common cause for both gallstone formation and recurrent attacks of pancreatitis.

1662 BACTERIOLOGIC STUDIES OF BILIARY TRACT INFECTION. *(E.)* Flemma, R. J. (Brooke Army Med. Ctr., Fort Sam Houston, Texas), L. M. Flint, S. Osterhout and W. W. Shingleton. *Ann. Surg.* 166(4): 563-572, 1967.

Aerobic and anaerobic cultures were grown from the intrahepatic bile of 75 patients undergoing aseptic percutaneous cholangiography and from the extrahepatic tract (gallbladder wall, gallbladder bile, common duct bile, and gallstones) of 21 patients during cholecystectomy from cholelithiasis and/or choledocholithiasis. Positive bile cultures were observed in 64% of cholangiography patients with partial common duct obstruction due to strictures, choledocholithiasis, and bile duct carcinoma; only 10% with complete obstruction secondary to pancreas carcinoma or ampulla had positive cultures. Bacterial concentrations of 10^5/ml or more may exist in the presence of obstruction with no symptoms, i.e., chills and fever, referable to their presence. Five patients undergoing cholangiography had septicemia. Trauma converts "asymptomatic bactibilia" to cholangitis. Biliary tract mucosa disruption allows bacteria to enter the bloodstream and to initiate septicemia. Fifty percent of extrahepatic cultures were positive in cholethithiasis and cholecystitis; clostridia were found in the gallbladder wall of some patients. These data provide a better understanding of cholangitis and may aid the surgeon in knowing which asymptomatic patients are likely to have biliary tract bacteria and in exercising precautions to prevent the conversion of "asymptomatic bactibilia" into cholangitis.

1663 THE GALLBLADDER AND GALLSTONE FORMATION. *(E.)* Caldwell, F. T., Jr. (Upstate Med. Ctr., Syracuse, New York) and K. Levitsky. *Ann. Surg.* 166(5):753-758, 1967.

In order to study the effects of lithogenic diets on gallstone formation, measurements were made for the following parameters in cystic duct-cannulated control and cholesterol-fed male and female rats: Hepatic bile formation rate; serum cholesterol; hepatic and gallbladder bile levels of bile acids, cholesterol, and lecithin; and liver cholesterol and fat content. Parameters were measured 2, 14, 28, and 60 days after diet initiation. Serum cholesterol levels increased significantly in male and female rats after 48 hours on the diet; there was no significant difference between the sexes. Hepatic bile formation did not increase significantly in either group after 48 hours or at 60 days in the female; increases at 14-60 days in the male were significant. Hepatic bile flow rates were significantly higher in males than in females. Hepatic bile cholesterol increased in both groups but the increment was greater in the females. After 60 days, increases in the bile acid concentration of hepatic bile were significant throughout the study with no difference between the sexes; increases in lecithin were significant only in females. Gallbladder bile cholesterol was higher after the lithogenic diet; in males, all increases were significant except at 48 hours. There were significant increases in bile acid concentration after 48 hours in the female; increments were not maintained in the male and decrements were seen after 60 days in both groups. Gallbladder bile lecithin increases were not significant. Whereas, the liver cholesterol content increased several-fold in both groups, the maximum liver fat content increase at 28-60 days in the female was 1-fold and was significantly less in the male. Gallstones formed 14 days after diet initiation in 50% of all animals; by 60 days, 85% of the rats were affected.

1664 DISEASES OF INTRAHEPATIC BILE DUCTS. *(E.)* Caroli, J. (St. Antoine Hosp., Paris, France). *Israel J. Med. Sci.* 4(1):21-35, 1968.

In a comprehensive review, it is stated that the apparent rarity of diseases of the intrahepatic bile (segmental collecting) ducts is due to the insufficient attention paid to this system. Successful i.v. cholangiography involves studies with and without morphine and requires proper positioning of the patient. The diseases discussed fall into the following classification: 1) Congenital diseases: dilations, strictures; 2) Neoplasms: papillomatosis and carcinoma of intrahepatic bile ducts; 3) Bile duct calculi: primary calculi in the intrahepatic bile ducts; and 4) Secondary lesions of the intrahepatic bile ducts in the presence of benign and malignant tumors, and simple and and parasitic cysts of liver (distortion, fistula formation, etc.). The normal radiological anatomy of the intrahepatic bile ducts is also discussed and illustrated.

1665 STUDIES OF HEPATIC EXCRETORY FUNCTION: IV. BILIARY EXCRETION OF SULFOBROMOPHTHALEIN SODIUM IN A PATIENT WITH THE DUBIN-JOHNSON SYNDROME AND A BILIARY FISTULA. *(E.)* Gutstein, S. (Albert Einstein Coll. Med., Bronx, N. Y.), S. Alpert and I. M. Arias. *Israel J. Med. Sci.* 4(1):36-40, 1968.

Hepatic storage and biliary excretion of sulfobromophthalein sodium (SBP) were studied in a patient with the Dubin-Johnson syndrome in whom quantitative bile collection was possible from a T-tube in the common bile duct. Relative hepatic storage of SBP was normal whereas secretion of SBP by the liver was virtually zero as estimated indirectly by analysis of SBP disappearance from serum and by direct analysis of bile. Intravenous injection of Decholin increased bile flow but did not alter the rate of either SBP removal from serum or dye excretion in bile. These results are consistent with the postulate that SBP and bile salts may be excreted by different hepatocellular mechanisms.

1666 EXPERIMENTAL CHOLELITHIASIS. *(E.)* Freston, J. W. and I. A. D. Bouchier. *Gut* 9(1): 2-4, 1968.

In a brief review of experimental models for the study of cholelithiasis (22 refs.), it is pointed out that the ideal technique should be simple of execution, reliable in that gallstones should form quickly and in every animal, the gallstone composition should resemble that in man, ample amounts of bile, stones, blood and tissue should be available for analysis, and there should be no extrabiliary toxicity. Furthermore, the selection of a particular technique, be it infection of the gallbladder or its contents, production of biliary stasis, or dietary changes, must depend on the purpose of the experiment: if the intention is to study the absorption of bile components by the gallbladder mucosa during gallstone formation, then rabbits, in which considerable information on absorption is available, would be preferable to rats (which lack a gallbladder) or mice (little information on absorption); on the other hand, a search for substances which might dissolve cholesterol stones *in vivo* would not be carried out in the rabbit-dihydrocholesterol model since these stones do not contain cholesterol. The techniques of infection and stasis are generally slow and inconsistent, compared with the frequency of gallstone formation on specially designed diets. Although the dihydrocholesterol-rabbit model is the most consistent and rapid, the gallstone composition does not resemble that in humans. On the other hand, gallstones produced in mice by a cholesterol-cholic acid diet do resemble those in humans, but large numbers of animals are required to provide sufficient material for analysis. The feeding of cholestyramine and modocoll to guinea pigs causes human-type gallstones with satisfactory frequency, rapidity and lack of hepatotoxicity, and is probably the most promising method.

1667 HEMOPERITONEUM AS A COMPLICATION OF ACUTE CHOLECYSTITIS: A REPORT OF TWO CASES. *(E.)* Becker, W. F. (Louisiana State U. Sch. Med., New Orleans). *Amer. Surg.* 34(1):88-93, 1968.

1668 THE RELATIONSHIP BETWEEN CORONARY HEART DISEASE AND GALLBLADDER DISEASE: A CRITICAL REVIEW. *(E.)* Friedman, G. D. (USPHS Hosp., San Francisco, Calif.). *Ann. Int. Med.* 68(1): 222-235, 1968.

1669 GANGRENE OF GALLBLADDER DUE TO ARTERIAL EMBOLISM. [CASE REPORT] *(E.)* Evans, D. S. (St. Thomas' Hosp., London, England) and J. A. Evans. *Brit. Med. J.* 1(5583):33, 1968.

1670 AN UNUSUAL CASE OF SPONTANEOUS INTERNAL BILIARY FISTULAE. *(E.)* Shiu, M. H. (Dept. Surg., U. Hong Kong). *Brit. J. Surg.* 54(11):969-971, 1967.

1671 NORMAL GAS-FILLED APPENDIX SIMULATING BILIARY-TREE AIR IN A CASE OF ACUTE CHOLECYSTITIS. *(E.)* Reilly, H. F., Jr. (Ellis Hosp., Schenectady, N. Y.), W. Mosenthal and J. R. Dyke. *Radiology* 89(5):931-932, 1967.

1672 GALLSTONE FORMATION IN THE GERM-FREE MOUSE. *(E.)* Frey, C. (U. Michigan Med. Ctr., Ann Arbor), C. Thorpe and G. Abrams. *Amer. J. Surg.* 115(1):75-81, 1968.

1673 A CLINICAL AND STATISTICAL CONTRIBUTION TO THE PROBLEM OF CALCULI DEVELOPING IN THE GALLBLADDER FOLLOWING GASTRIC RESECTION. *(It.)* Ceccarini, E. and H. Mutabakani. *Arch. Atti Soc. Ital. Chir.*, pp. 431-437. [Proceedings of the 67th Congress, Palermo, 14-16 Oct 1965.] Rome, E.M.E.S., 1967. 627 pp.

1674 CHOLELITHIASIS AND CARCINOMA OF THE GALLBLADDER IN THE BIOPSY AND AUTOPSY MATERIAL. *(Pol.)* Sosnik, H. (Wroclaw Med. Acad., Poland) and J. Rabczynski. *Pol. Tyg. Lek.* 23(15):540-542, 1968.

1675 EARLY DIABETIC METABOLIC ANOMALIES AND BIOPSY-CONFIRMED SEVERITY OF FATTY LIVER IN GALLSTONE PATIENTS. *(Ger.)* Kremer, G. J. (Med. Clin., Gutenberg U., Mainz, Germany), B. Knick, H. J. Lange, F. K. Kossling and H. Grams. *Schweiz. Med. Wsch.* 98(4):110-114, 1968.

1676 GALLSTONE PROBLEMS. *(Ger.)* Fehr, A. M. (Canton Hosp., Winterthur, Switzerland). *Schweiz. Med. Wschr.* 98(4):97-101, 1968.

1677 IMPORTANCE AND VALUE OF THE BILIARY PIGMENTS COMPARED CLINICALLY. *(Sp.)* Diaz-Rubio, M. (Fac. Med., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 26(8):1001-1006, 1967.

1678 INTRAHEPATIC CHOLESTASIS IN PRIMARY HYPERPARATHYROIDISM. *(Cz.)* Petera, V. (Int. Med. Clin. Med. Fak. Charles U., Plzen, Czechoslovakia) and V. Krauz. *Cs. Gastroenterologie* 21(8):514-516, 1967.

1679 ACUTE GALLBLADDER HEMORRHAGE AND HEMOBILIA DUE TO GALLBLADDER CANCER. [CASE REPORT] *(Fr.)* Patel, J. (Surg. Clin., Hôtel-Dieu, Paris, France) and B. Robin. *Presse Med.* 76(12):577-578, 1968.

1680 BILIO-DIGESTIVE FISTULAS. [CASE REPORT] *(Rev.)(Sp.)* Sueiras Fechtenburg, A. *An. Med.* 53(2):208-215, 1967.

1681 BILIO-DIGESTIVE (CHOLECYSTO-COLIC) FISTULA. [CASE REPORT] *(Sp.)* Martin-Guerra, W. (Nuestra Senora del Sagrado Corazon de Jesus Hosp., Barcelona, Spain). *An. Med.* 53(2):201-207, 1967.

1682 TOTAL RIGHT HEPATECTOMY FOR A TUMOR AT THE CONFLUENCE OF THE HEPATIC DUCTS. [CASE REPORT] *(Fr.)* Rohner, A. (Surg. Clin., U. Geneva, Switzerland). *Helv. Chir. Acta* 35(1/2):95-100, 1968.

1683 HAEMOPERITONEUM ASSOCIATED WITH A RUPTURED GALLBLADDER. [CASE REPORT] *(E.)* Atkins, P. (King's Coll. Hosp., London, England). *Brit. Med. J.* 4(5579):602, 1967.

1684 PRESENTATION OF A CASE OF PRIMARY ODDITIS. *(Sp.)* Acevedo Gallegos, F. (Fac. Med., Ctr. U. Venezuela, Caracas), E. Yanes Lecuna and P. Cardier Gago. *G.E.N.* 22(2):163-172, 1967.

1685 CARCINOMA OF CYSTIC DUCT LEADING TO HYDROPS OF GALLBLADDER. [CASE REPORT] *(E.)* Pack, G. T. (New York City) and P. K. Teng. *J.A.M.A.* 203(2):153-154, 1968.

1686 HEMOBILIA IN MALIGNANT AFFECTION OF THE BILIARY TRACT. *(Rus.)* Avdei, L. V. (Minsk Med. Inst., USSR). *Khirurgiia (Moskva)* 44(1):126-127, 1958.

1687 CARCINOMA IN CHOLEDOCHAL CYST. [TWO CASES] *(E.)* Macfarlane, J. R. (New York Hosp. Cornell Med. Ctr., N. Y.) and F. Glenn. *J.A.M.A.* 202(11):1003-1006, 1967.

1688 THE AETIOLOGY OF GALLSTONES. *(Rev.) (E.)* Bouchier, I. A. D. (Royal Free Hosp., London, England) and J. W. Freston. *Lancet* 1(7538):340-344, 1968.

1689 **BILIARY HYPOPLASIA.** *(E.)* Porter, S. D. (U. Iowa Hosp., Iowa City), R. T. Soper and R. T. Tidrick. *Ann. Surg.* 167(4):602-608, 1967.

1690 **ADENOMA OF THE COMMON BILE DUCT CAUSING OBSTRUCTIVE JAUNDICE.** *(E.)* McIntyre, J. A. (St. Joseph's Hosp., Toronto, Ontario), P. Z. Cheng. *Canad. J. Surg.* 11(2):215-218, 1968.

1691 **STRICTURES OF THE COMMON BILE DUCT: A REPORT OF 12 CASES.** *(E.)* McKenzie, A. D. (Vancouver Gen. Hosp., British Columbia). *Canad. J. Surg.* 11(2):135-143, 1968.

1692 **HETEROTOPIC PANCREAS: AN UNUSUAL CAUSE OF OBSTRUCTION OF THE COMMON BILE DUCT.** *(E.)* Weber, C. M. (Perth Amboy Gen. Hosp., N. J.), P. F. Zito and S. M. Becker. *Amer. J. Gastroent.* 49(2):153-159, 1968.

1693 **CONGENITAL DIAPHRAGM OF THE COMMON HEPATIC DUCT.** *(E.)* Fisher, M. M. (U. Pittsburgh Med. Sch., Pa.), S. Chen and A. Dekker. *Gastroenterology* 54(4):605-610, 1968.

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00786* 00786* 00856 00859 00886* 01034* 01035* 01170*
01195 01215 01298* 01303* 01308* 01341 01349 01351
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00786* 00786* 00832* 00835* 00868 01049 01172* 01300*
01303*
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01128 01137* 01269 01380* 01427 01461 01488*
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00810 00906 01054 01181* 01287 01404*
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00952* 01089
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00920* 00963 00969 00999 01053 01178* 01183*
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00994
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00920* 00975 01013
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01013 01464*
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00973 00976 01006 01054 01119
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00924* 00977 00980 01101 01249* 01503 01652* 01655*
01660* 01664* 01670 01671 01680 01681
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00942* 00980 01034* 01035* 01145 01154 01155 01157
01160
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00977
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00932* 00943* 00969 00980 00989 00998 01006 01027*
01050 01057 01100 01101 01252*
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01053 01091 01124 01388* 01389* 01411 01431 01432
01442 01443 01453 01454
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00941* 00987 01117 01533* 01537* 01538* 01545* 01554
01561
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00836* 00967 00988 00994 01021* 01488* 01510* 01519
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01131
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00925* 00966 00968 00988 00994 01013 01048* 01091
01124 01267 01279 01285 01288 01318* 01388* 01619*
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00920* 00959 00975 00999 01014 01034* 01035* 01048*
01167* 01168* 01174* 01176* 01178* 01182* 01185 01198
01199 01200 01209 01216 01217 01221 01228 01229
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01472*
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00892* 01026* 01044*
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00935* 01017* 01020* 01033* 01380* 01383* 01407* 01426
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00935* 00957 01398* 01399*
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SEE ALSO ACHLORHYDRIA
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00845* 00869 00935* 00970 00974 01034* 01166* 01361
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01090
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00993 00995 01001 01090 01194 01198 01199 01200
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01603 01615* 01616* 01631 01639* 01668
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00811 00922* 00923* 00925* 00982 01250* 01266 01289
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01128 01253* 01281 01282 01501
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00830 01248* 01270 01375 01518
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01271
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01013 01091 01250* 01266 01288 01289 01503 01619*
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01255*
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00921*
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01371* 01373* 01374*
SMALL INTESTINE FISTULAS
01273 01275 01276 01278 01652* 01655*
SMALL INTESTINE IMMUNOLOGY
00925* 01376
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01267 01295 01373*
SMALL INTESTINE METABOLISM
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00972
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00821
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00785* 00785* 00787* 00787* 00881* 00885* 00889 00921*
SMALL INTESTINE MUCOSA
00817* 00826 00922* 00923* 01027* 01048* 01080 01082
01177* 01255* 01260* 01264 01273 01287 01289 01373*
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01265 01503
SMALL INTESTINE NEOPLASMS,BENIGN
01051 01083 01262 01263 01270 01272 01282 01370
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01029* 01083 01253* 01268 01269 01279
SMALL INTESTINE OBSTRUCTION
01091 01124 01125 01171* 01246* 01247* 01249* 01254*
01263 01277 01278 01279 01290 01291 01294
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00892* 01264 01280 01286 01339 01373*
SMALL INTESTINE PERFORATION
01069 01251* 01269 01273 01290 01368
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00818*
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01256* 01274 01280
SMALL INTESTINE RADIOLOGY
SEE ALSO SMALL INTESTINE DIAGNOSIS
00925* 00966 00968 00988 00994 01013 01048* 01091
01124 01267 01279 01285 01288 01318* 01388* 01619*
SMALL INTESTINE SECRETION
00841*
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00787* 00787* 01038* 01058 01091 01134 01248* 01249*
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01284 01293 01294 01307* 01369 01526 01652*
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00787* 00787* 01151 01273 01276
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01377* 01381* 01386*
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00913 00916 01464*
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01122 01195 01303* 01341 01349 01351
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00813*
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00831* 00832* 00835* 00840* 00843* 00844* 00845* 00848*
00850* 00853 00856 00857 00858 00859 00862 00867
00868 00870 00871 00872 00873 00874 00876 00888
00934* 00935* 00936* 00953* 00974 00993 01001 01014
01034* 01051 01090 01166* 01172* 01174* 01177* 01198
01199 01259* 01296* 01301* 01305* 01308* 01310* 01313*
01314* 01315* 01316* 01317*
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00799* 00838* 00853 00880 01179* 01181* 01235 01309*
STOMACH BIOPSY
00789* 00834* 01034* 01166* 01167* 01177* 01209 01216
01232 01234 01242
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00837* 00929* 00935* 00948* 00963 00975 00999 01020*
01028* 01033* 01035* 01047* 01090 01129 01167* 01169*
01170* 01175* 01178* 01179* 01182* 01183* 01186 01188
01189 01190 01212 01215 01216 01219 01222 01224
01226 01227 01232 01235 01239 01240 01241 01243
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00808 00861 01175*
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00834* 00920* 00959 00965 00970 00974 01007 01014
01034* 01035* 01111 01166* 01167* 01168* 01169* 01174*
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01129
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01216 01232 01242 01332
STOMACH ENZYMES
00789* 00838* 00880 01309*
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01180* 01209 01241
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00786* 00786* 01097 01210 01213 01222
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SEE ALSO STOMACH SECRETION DISORDERS
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00813* 01181* 01205 01309*
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00786* 00786* 00886* 00887* 00888 00890 01048* 01171*
01172* 01176* 01316* 01359
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00789* 00808 00810 00834* 00835* 00840* 00844* 00845*
00862 00876 00975 01027* 01048* 01051 01080 01082
01166* 01171* 01173* 01176* 01177* 01179* 01180* 01181*
01197 01202 01220 01232 01301* 01309* 01314* 01335
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00819* 01185 01231
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00956 01204
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01174* 01182* 01233 01234
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01096 01169* 01173* 01176* 01185 01190 01196 01201
01226 01228 01233 01335
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01231
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00959 01054 01175* 01197 01203 01204 01208 01220
01226 01232 01241 01243 01326 01335
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00834* 00837* 00838* 00845* 00846* 00850* 00858 00859
00862 00872 00880 00955 01090 01166* 01296* 01301*
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01207 01210 01212 01213 01514*
STOMACH PERFUSION
00865
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SEE ALSO STOMACH DIAGNOSIS
00920* 00959 00975 00999 01014 01034* 01035* 01048*
01167* 01168* 01174* 01176* 01178* 01182* 01185 01198
01199 01200 01209 01216 01217 01221 01228 01229
01232 01234 01298* 01319* 01320* 01361
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00797 00833* 00850* 00854 00861 01092 01104 01181*
01194 01209 01299*
STOMACH SECRETION DISORDERS
00845* 00869 00935* 00970 00974 01034* 01166* 01361
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01090
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00807 00838* 00847* 00848* 00858 00865 00934* 00974
00993 00995 01001 01090 01194 01198 01199 01200
01308* 01313*
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00819* 00831* 00832* 00842* 00846* 00847* 00853 00867
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00850* 00852* 00859 00862 00870 00871 00873 00993
01310* 01314* 01358 01359
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00831* 00841* 00842* 00843* 00848* 00852* 00856 00857
00859 00862 00867 00868 00871 00872 00873 00874
01358 01359 01362
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00807 00835* 00970 01038* 01047* 01170* 01171* 01174*
01178* 01182* 01183* 01184* 01186 01187 01193 01210
01211 01213 01215 01218 01219 01222 01225 01227
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01203
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00861 00886* 00888 00890
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00819* 01030* 01231
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00795 01023*
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01657*
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00893* 00894*
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01590 01636*
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00958 01458 01463
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01592 01594 01595
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01609
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01486* 01491* 01506
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00808 01205 01208
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01469* 01481
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01357 01364
STUDIES,BIOCHEMICAL
00917
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00979
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00807 00841* 00842* 00847* 00857 00870 00871 00873
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STUDIES,MARKER
00856 00951* 00961 01010 01237
STUDIES,MOTILITY PRESSURE
SEE ALSO ANAL MOTILITY
SEE ALSO BILIARY TRACT MOTILITY
SEE ALSO GASTROINTESTINAL MOTILITY
SEE ALSO LARGE INTESTINE MOTILITY
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00785* 00785* 00883* 01172* 01381* 01410*
STUDIES,PAVLOV POUCH
00842* 00847*
STUDIES,PSYCHOLOGICAL
SEE ALSO PEPTIC ULCERS
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01046* 01456 01476 01477
STUDIES,TRACER
00808 00810 00812* 00830 00893* 00894* 00897 00903
00925* 00941* 00945* 00951* 00956 00961 00963 00983
01010 01261* 01529* 01640*
STUDY TECHNIQUES,ABSORPTION
00816* 00818*
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01239 01590 01591
STUDY TECHNIQUES,DYE
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00798 00799 00897 00903
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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available, free to qualified interested investigators and practitioners, citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology has accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis and Metabolic Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

GASTROENTEROLOGY ABSTRACTS and CITATIONS is published monthly and includes citations and abstracts from the biomedical world literature as they are currently received. In addition, yearly cumulated subject and author indexes are published. Requests from qualified individuals to receive free copies of this publication, and address changes and other communications from these individuals should be addressed to:

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus.* For journals not covered by *Index Medicus,* the abbreviations (with some modifications) found in *World Medical Periodicals,* 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans
Ar.	Arabic
Bul.	Bulgarian
Ch.	Chinese
Cz.	Czech
Dan.	Danish
Dut.	Dutch
E.	English
Eston.	Estonian
Fin.	Finnish
Fl.	Flemish
Fr.	French
Ger.	German
Gr.	Greek
Heb.	Hebrew
Hun.	Hungarian
Ic.	Icelandic
In.	Indonesian
It.	Italian
Jap.	Japanese
Kor.	Korean
Latv.	Latvian
Lith.	Lithuanian
Nor.	Norwegian
Pol.	Polish
Por.	Portuguese
Rum.	Rumanian
Rus.	Russian
Ser.	Serbo-Croatian
Sl.	Slovak
Sp.	Spanish
Sw.	Swedish
Th.	Thai
Turk.	Turkish
Uk.	Ukrainian
Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
ATP	adenosine triphosphate
C	degrees centigrade
cm	centimeter(s)
CNS	central nervous system
cpm	counts per minute
DNA	deoxyribonucleic acid
e.g.	for example
g	gram(s)
µg	microgram(s)
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kg	kilogram(s)
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar
mEq	milliequivalent(s)
mM	millimolar
µM	micromolar
mC, µC	milli-, microcurie(s)
mg	milligram(s)
min	minute(s)
ml	milliliter(s)
mm	millimeter(s)
MTD	maximum tolerated dose
ng	nanogram (10^{-9})
pg	picogram (10^{-12})
p.o.	orally
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
Rev.	review (only in citations)
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

GENERAL

1694 STUDIES OF INTESTINAL MICROFLORA. I. EFFECTS OF DIET, AGE, AND PERIODIC SAMPLING ON NUMBERS OF FECAL MICROORGANISMS IN MAN. *(E.)* Gorbach, S. L. (Tufts U. Sch. Med., Boston, Mass.), L. Nahas, P. I. Lerner and L. Weinstein. *Gastroenterology* 53(6):845-855, 1967.

Data on day-to-day fluctuations, and the effects of age, diet, and periodic sampling on fecal microflora in man were analyzed statistically from samples collected from 70 normal individuals (20 to 100 yr in age). Based on 110 fecal specimens from 60 normal individuals, it was found that elderly subjects harbor fewer anaerobic lactobacilli (bifidus bacteria) and larger numbers of fungi and coliforms than young persons. The effect of a standard diet did not produce a standardization of fecal microflora in this study. The variation in numbers of bacteria noted in people of the same age was shown not to be due to error or difficulties in sampling or variations in diet. The numbers of bacteria recoverable from the same person over a 7-week or 7-month period were very consistent. Intestinal motility appears to be a factor in determining the types and numbers of bacteria present.

1695 STUDIES OF INTESTINAL MICROFLORA. II. MICROORGANISMS OF THE SMALL INTESTINE AND THEIR RELATIONS TO ORAL AND FECAL FLORA. *(E.)* Gorbach, S. L. (Tufts U. Sch. Med., Boston, Mass.), A. G. Plaut, L. Nahas, L. Weinstein, G. Spanknebel and R. Levitan. *Gastroenterology* 53(6):856-867, 1967.

The small intestinal microorganisms of 18 normal subjects on a normal diet were identified in 68 samples of intestinal contents aspirated by long tube. The reproducibility of the method in man and dogs was evaluated. In 4 individuals, serial samples from areas from the stomach to the terminal ileum were obtained sequentially. In 3 subjects, samples were aspirated simultaneously from the terminal ileum and cecum by means of a double lumen tube. Small intestinal microflora were found to consist of small numbers of streptococci, lactobacilli, staphylococci, and fungi, and generally to increase in numbers in the distal areas of the small intestine. A difference in number and types of microorganisms present on the proximal and distal sides of the ileocecal valve was noted. Two distinct ecologies are distinguished here: (a) the predominantly Gram-positive species of the upper small bowel, and (b) the Gram-negative species of the colon with bacteroides, anaerobic lactobacilli and coliforms. Multiple sequential sampling indicates that Gram-positive species may constitute the true indigenous flora of the upper small bowel rather than representing transient mouth flora.

1696 STUDIES OF INTESTINAL MICROFLORA. III. THE MICROBIAL FLORA OF HUMAN SMALL INTESTINAL MUCOSA AND FLUIDS. *(E.)* Plaut, A. G. (Tufts U. Sch. Med., Boston, Mass.), S. L. Gorbach, L. Nahas, L. Weinstein, G. Spanknebel and R. Levitan. *Gastroenterology* 53(6):868-873, 1967.

Biopsies of small intestinal mucosa and fluid samples were collected from 5 normal human subjects and analyzed for microorganisms. Biopsy sites included the ligament of Treitz and midjejunum in all cases, distal jejunum in 2, and proximal ileum in 1. The predominant flora of the juice consisted of anaerobic streptococci and lactobacilli. Of the 13 biopsies cultured, 8 yielded growth after vigorous washing, consisting of 60 aerobic and 32 anaerobic organisms with streptococci and lactobacilli predominating in the aerobic and anaerobic cultures. No differences could be detected in the types of organisms present in biopsy specimens taken at various levels of the small intestine. Microscopic examination showed these forms adherent to the tissues, but not within or between the cells of the mucosa.

1697 RISE IN SERUM IMMUNOREACTIVE GLUCAGON AFTER INTRAJEJUNAL GLUCOSE IN PANCREATECTOMIZED DOGS. *(E.)* Buchanan, K. D. (Dept. Med. & Surg., U. Washington, Seattle), J. E. Vance, T. Aoki and R. H. Williams. *Proc. Soc. Exp. Biol. Med.* 126(3): 813-815, 1967.

In order to clarify the contribution of intestinal and pancreatic immunoreactive glucagon (IRG) to the serum IRG level under various conditions, the serum IRG levels in 2 pancreatectomized dogs were studied under basal conditions and following alimentary glucose. Data are also presented for IRG levels in various organs of human, mongrel dog, squirrel monkey, and Wistar rats. Assay methods involved raising glucagon antibody in guinea pigs for use in a double antibody technique with crystalline beef-pork glucagon as a standard reference. Immunological differences existed between pancreatic and jejunal glucagon in the human and dog, but pancreatic and rectal glucagon appeared similar. A rise in serum IRG was seen in dogs after oral glucose (2 g/kg body weight), and after pancreatectomy basal serum levels fell slightly, followed by a sharp rise in serum IRG after intrajejunal glucose, suggesting an enteric source.

1698 IMMUNOCHEMICAL STUDIES WITH SYNTHETIC HUMAN GASTRIN. *(E.)* McGuigan, J. E. (Washington U. Sch. Med., St. Louis, Missouri). *Gastroenterology* 54(6):1005-1011, 1968.

SHG:2-17 (synthetic human gastrin I residues 2-17) conjugated to bovine serum albumin produced gastrin antibodies detectable in the sera of 3 New Zealand white rabbits 14 days after a 2 mg antigen injection. Radioimmunoassay, utilizing the precipitation of antibody-bound $[^{131}I]$SHG:2-17 (specific activity 70-300 mC per micromole), identified the antibodies as gamma-G-immunoglobulins. The sensitivity of the immunoassay is sufficient to measure physiological levels of gastrin in human serum.

1699 ANTIBODIES TO THE C-TERMINAL TETRAPEPTIDE AMIDE OF GASTRIN. ASSESSMENT OF ANTIBODY BINDING TO CHOLECYSTOKININ-PANCREOZYMIN. *(E.)* McGuigan, J. E. (Washington U. Sch. Med., St. Louis, Missouri). *Gastroenterology* 54(6):1012-1017, 1968.

An immunological cross-reactivity between the C-terminal tetrapeptide amide of gastrin and cholecystokinin-pancreozymin was revealed after gel filtration analysis of gastrin tetrapeptide,

[^{3}H] acetyl gastrin tetrapeptide and cholecystokinin-pancreozymin after incubation with the antisera of New Zealand white rabbits obtained 14 days after final immunization with 5 mg of gastrin tetrapeptide amide conjugated to bovine gamma-globulin. Cholecystokinin-pancreozymin inhibited the antibody binding of [^{3}H] acetyl gastrin tetrapeptide amide. The results corroborate the finding of Mutt and Jorpes that the carboxyl terminal of gastrin and cholecystokinin-pancreozymin are identical.

1700 FRACTIONATION AND PARTIAL PURIFICATION OF GASTRONE.

(E.) Fiasse, R. (New York Med. Coll., New York City), C. F. Code and G. B. J. Glass. *Gastroenterology* 54(6):1018-1031, 1968.

Gastric secretory inhibitors were investigated in the gastric juices from patients with histamine-fast anacidity. The samples were dialyzed, and the dialyzates pooled and fractionated on gel columns; the fractions were further analyzed by paper electrophoresis, immunoelectrophoresis, double immunodiffusion, and acrylamide gel disc electrophoresis. A potent inhibitor, glycoprotein or glycopolypeptide in nature, was found in 6 out of 9 gastric juice pools; it caused a 50% decrease in gastric acid secretion in rats with pyloric ligations. The molecular weight of the inhibitor was estimated to be between 10,000 and 40,000. A slightly less active inhibitor was isolated from another pool, but not from the 2 normal acid gastric pools. Inhibitory activity was decreased by peptic digestion. Both acid and anacid human gastric juice contain at least one other less active inhibitory substance of high molecular weight and anodic electrophoretic properties and which is related to mucosubstances and resistant to peptic digestion.

1701 ANTIBODIES TO THE CARBOXYL-TERMINAL TETRAPEPTIDE OF GASTRIN.

(E.) McGuigan, J. E. (Washington U. Sch. Med., St. Louis, Mo.). *Gastroenterology* 53(5):697-705, 1967.

The methods used in producing and characterizing antibodies to the physiologically active C-terminal tetrapeptide functional group (tryptophan-methionine-aspartic acid-phenylalanine amide) of gastrin are described. The tetrapeptide was conjugated to bovine γ-globulin as a carrier protein (by linking the tryptophyl-terminal amino group to the lysine ϵ-amino group) and was injected into New Zealand white rabbits. The antibodies produced were predominantly γG-immunoglobulins. For assay, the gastrin tetrapeptide was acylated with (^{3}H)-acetic anhydride and complexed with the produced antibody. Antibody activity was determined by equilibrium dialysis and gel filtration to determine the degree of binding of antibody with the (^{3}H)-acetyl tetrapeptide. The antibodies demonstrated specificity for synthetic human gastrin, for naturally occurring porcine gastrin, for the tetrapeptide used as the antigenic determinant in the antibody production, and for the gastrin-like pentapeptide ICI 50,123. Competitive binding experiments indicate the C-terminal tetrapeptide to be an accessible active site on the surface of the gastrin molecule.

1702 EFFECT OF N,N$'$-2,7-FLUORENYLENEBISACETAMIDE AND N-2-FLUORENYLACETAMIDE ON GASTRIC SECRETION AND CELL POPULATION IN RATS.

(E.) Bralow, S. P. (Temple U. Health Sci. Ctr., Philadelphia, Pa.), M. Brown, M. Gruenstein and M. B. Shimkin. *Gastroenterology* 53(5):719-730, 1967.

Alterations in gastric secretion and mucosal cell mass were studied during the development of the neoplastic reaction to repeated i.p. administration of N,N$'$-2,7-fluorenylenebisacetamide (2,7-FAA) and N-2 fluorenylacetamide (2-FAA) in 200 male Buffalo rats (7 weeks age, approximately 140 g weight). In 3 groups (61 untreated controls, 58 treated with 2-FAA, and 53 treated with 2,7-FAA), using a pylorus ligation technique, treatment was administered for periods of 15, 25, and 28 weeks using concentrations of 6 mg of 2,7-FAA/0.5 ml of gum acacia, and 4.8 mg of 2-FAA/0.5 ml. Each animal received 0.5 ml of the respective suspension i.p. thrice a week for 10 weeks, and twice a week thereafter till the end of the experiment. A normal diet was provided. Failure to gain weight was more marked with 2,7-FAA treatment. Both 2,7-FAA and 2-FAA produced reduction in pepsin concentration in gastric secretion (34-47% and 30-37%, resp.). By the 25th and 28th weeks of treatment with 2,7-FAA treatment, respective decreases were seen in mean volume (19% and 54%) and total acid output (22% and 69%), prior to development of the mucosal atrophy of glandular carcinoma. With 2-FAA, volume increased 29% and no changes in total acidity occurred. Parietal and zymogen cell mass were estimated and no changes were seen with either treatment.

1703 COMPARATIVE EFFECT OF LONG-TERM ANTICHOLINERGIC ADMINISTRATION WITH GLYCOPYRROLATE AND OF VAGOTOMY ON PARIETAL CELL FUNCTION, ULTRASTRUCTURE, AND POPULATION.

(E.) Posey, E. L. (U. Mississippi Sch. Med., Jackson), R. Elliott, B. Shewmake and L. Posey. *Amer. J. Dig. Dis.* 13(6):515-526, 1968.

Eight stomach-cannulated dogs, 4 glycopyrrolate-treated (0.2 mg/kg body weight, 4 times daily) and 4 vagotomized, were given histamine tests (0.4 mg/kg) with and without prior glycopyrrolate injections (0.04 mg) after a 12-hr fast to compare the effects of glycopyrrolate administration and vagotomy on parietal cell function, ultrastructure and population after 12 weeks; samples of stomach mucosa with oxyntic cells were taken at cannulation and at sacrifice and examined by electron microscopy. Four rats were sacrificed and parietal cell counts made; 6 glycopyrrolate-treated rats were sacrificed 4, 6, and 8 weeks after treatment. Decreased histamine responsiveness was noted in dogs given glycopyrrolate prior to histamine tests; no significant changes were observed in those without pre-histamine glycopyrrolate injections. Histamine responsiveness was suppressed in all vagotomized dogs after 1 week; further suppression was observed in pre-histamine glycopyrrolate-treated dogs. Parietal cell changes, noted in 25-75% of the treated dogs, included: intracellular canaliculi collapse; dilatation, vacuolation and granulation of the endoplasmic reticulum; loss of cell detail; nuclear collapse; irregular, vacuolated and swollen mitochondria; and sparse, blunted microvilli. The degree of ultrastructural alteration varied from cell to cell in the same species; no changes were noted in vagotomized dogs. Swollen, irregular, and vacuolated mitochondria, absent canaliculi, and double-membraned vacuoles characterized the parietal cells of glycopyrrolate-treated rats. No significant changes in parietal cell counts were observed in glycopyrrolate-treated

ogs or rats, or in vagotomized dogs. Long-term glycopyrrolate
dministration is apparently more effective than vagotomy in
hibiting gastric secretion.

704 **GASTRIC TEMPERATURE ADAPTATION.** *(E.)* Shapiro, H. (Albert Einstein Med. Ctr.,
hiladelphia, Pa.) and E. K. Stoner. *Amer. J. Gastroent.*
9(5):391-404, 1968.

astric, oral, rectal and cutaneous temperatures, and the
inetics of their changes in response to ingestion of hot or
old water of known heat content relative to the stomach con-
ents, were studied in 22 experiments on 5 fasting adult volun-
eers (3 men and 2 women) sitting or reclining in a constant-
emperature room. Temperatures were recorded by means of
opper-constantan thermocouples connected to a Brown record-
ng potentiometer. After ingestion of 17-1000 cc of cold water
vith a heat content of 476-34,900 g-calories below that of the
tomach contents (water drunk as rapidly as possible in a total
f 0.3-6.0 min), there was a sharp drop in gastric temperature
by as much as 17C) followed by a gradual return at a rate
vhich was inversely proportional to the amount ingested.
ollowing ingestion of hot water (maximum temperature of
5C), the curve was essentially the mirror image of that ob-
ained after cold water (maximal increase of about 8C). The
ime course for return to within 0.5C of normal gastric tem-
erature was similar for hot and cold water and was a function
f the heat content (gram-calories of heat which would have to be lost or gained to change the temperature of the ingested water to the normal intragastric temperature just before ingestion). For cold water, the total time required varied from 6 min at 476 g-calories to 73 min at 34,900 g-calories, while for warm water it varied from 3 min at 524 g-calories to 60 min at 20,680 g-calories. Due to the increase in gastric emptying rate, the recovery time decreased with an increase in volume of fluid ingested. The response of the rectal temperature paralleled that of the gastric temperature, but the changes in temperature were much less marked (drop of 0.2-0.8C for 5000-35,000 g-calories of cold water; rise of 0.14C for 6800 g-calories of hot water) and the recovery was prolonged. The change was greater with cold water than with warm water, probably due to the greater efficiency of cutaneous vasodilatation and perspiration as compared to metabolic changes in temperature homeostasis. Skin temperatures at the forehead and right great toe were relatively constant, but that at the finger tips showed the effects of prompt vasoconstriction and vasodilatation. The urinary output increased and its specific gravity decreased after ingestion of ice water.

1705 **DEGENERATION OF EPITHELIUM FROM VARIOUS PORTIONS OF THE DIGESTIVE TRACT AFTER INTRATESTICULAR TRANSPLANTATION IN THE RAT.** *(Fr.)* Tharanne, M. J. (Sch. Med. Pharm., Tours, France). *C. R. Soc. Biol. (Paris)* 161(6):1421-1423, 1967.

1706 **COLONIC PERICRYPTAL FIBROBLAST SHEATH: REPLICATION, MIGRATION, AND CYTODIFFERENTIATION OF A MESENCHYMAL CELL SYSTEM IN ADULT TISSUE. II. FINE STRUCTURAL ASPECTS OF NORMAL RABBIT AND HUMAN COLON.** *(E.)* Kaye, G. I. (Columbia U. Coll. Phys. Surg., New York City), N. Lane and R. R. Pascal. *Gastroenterology* 54(5): 852-865, 1968.

Normal colonic mucosa from adult humans operated on for localized carcinoma and normal adult rabbits was examined under the electron microscope in order to elucidate the fine-structural changes which occur in the pericryptal fibroblasts as they migrate toward the free surface of the colonic mucosa. The colonic pericryptal sheath was found to consist of a self-renewing population of fibroblasts, each of which maintains intimate contact with the epithelial basement lamina as it migrates, synchronously with the epithelium, from the deep germinative zone to the surface of the crypt. During migration, the fine-structural appearance of the fibroblast changes from that of an undifferentiated cell to that of a mature fibrocyte engaged in protein synthesis. Fibroblasts in the germinative zone are fusiform and shingled. As they migrate toward the surface, the nucleus and perikaryon move away from the adepithelial surface and portions of the cell membrane invaginate, forming bays into which collagen is secreted. At the mouth of the crypt, where the differentiated and functioning fibrocytes maintain contact with the lamina densa through long cytoplasmic processes, collagen deposition is maximal. A wide collagen table is formed under the free surface epithelium, and the body of the pericryptal fibrocyte is embedded in collagen. This body contains lysosome-like particles indicative of an aging cell. Deep in the crypt, the shingling of the fibroblasts creates an apparently continuous sheath, while under the surface epithelium this sheath becomes fenestrated since only delicate, stellate processes of the fibrocytes maintain close contact with the epithelial basal lamina. The fenestrated appearance of the pericryptal fibrocyte processes in the zone of cellular differentiation, which subtends the fully differentiated absorptive epithelium, may shed some light on the nature of the epithelial basal complex and the role of the pericryptal sheath and the collagen table in fluid transport across the colonic mucosa. Correlating these morphological data with the kinetic measurements described in a previous paper leads to the concept of an integrated epithelial-mesenchymal system which is involved in maintaining the normal morphology and cellular dynamics of the colonic mucosa.

1707 **COLONIC PERICRYPTAL FIBROBLAST SHEATH: REPLICATION, MIGRATION, AND CYTODIFFERENTIATION OF A MESENCHYMAL CELL SYSTEM IN ADULT TISSUE. I. AUTORADIOGRAPHIC STUDIES OF NORMAL RABBIT COLON.** *(E.)* Pascal, R. R. (Columbia U. Coll. Phys. Surg., New York City), G. I. Kaye and N. Lane. *Gastroenterology* 54(5):835-851, 1968.

Specimens of descending colon from normal adult rabbits and adult humans undergoing colectomy for localized carcinoma were subjected to light microscopy in order to demonstrate the existence of a colonic pericryptal sheath and to elucidate the arrangement of the reticulin and collagen fibers and the nature of the fibroblast population of the sheath. The mesenchymal sheath which surrounds the normal colonic crypt of Lieberkühn was found to be a specialized part of the lamina propria consisting of a distinct and highly organized system of fibroblasts, collagen and mucopolysaccharide-ground substance immediately subjacent to the epithelium. The fibroblasts are elongated cells tightly applied to the base of the epithelial cells of the crypt, and each subtending about 54-70 epithelial cells depending upon its position within the crypt. The collagen is laid down in an orderly circumferential arrangement, in marked contrast to the loose meshwork of the reticulin in the rest of the lamina propria. Autoradiographic studies of rabbit colon 11 min to 20 days after the i.v. injection of either a single dose of ^{3}H-thymidine (0.8 mC) or 5 doses of 0.9-1.0 mC at 30-min intervals revealed a "steady-state" renewal of the pericryptal fibroblasts and their migration, in synchrony with the epithelial migration, from the germinative region in the lower one-third of the crypt to the collagen table beneath the epithelium of the free surface. The fibroblast progenitor population, like that of the epithelium, is in the lowest third of the crypt where there is very little collagen. With time, the proportion of radioactivity immediately under the surface epithelium, where there is a relatively thick collagen table, increases markedly, suggesting a functional maturation of the pericryptal fibroblast as it ascends the crypt wall. These results suggest that the pericryptal fibroblasts and the epithelium act as a unit to maintain the normal structure, maturation and function of the crypt of Lieberkühn.

1708 **A LIGHT AND ELECTRON MICROSCOPIC STUDY OF DUODENAL EPITHELIUM OF CHICK EMBRYOS CULTURED IN THE PRESENCE AND ABSENCE OF HYDROCORTISONE.** *(E.)* Dobbins, W. O. III (Duke U. Med. Ctr., Durham, N. C.), J. C. Hijmans and K. S. McCarty. *Gastroenterology* 53(4):557-574, 1967.

The development of chick embryo duodenal mucosa is traced by electron microscope from the 16th to 20th day of growth *in vitro* with and without hydrocortisone, and *in vivo* by light microscope. Maturation of epithelial cells occurred at similar rates *in vivo* and *in vitro* but *in vitro* the presence of mitochondrial enlargement and autophagic vacuoles suggested cellular degeneration was present. Hydrocortisone had no effect on differentiation but surface coat development was improved, which can be correlated with invertase induction by hydrocortisone. Endoplasmic reticulum dilatation and moderate autophagy were present, however, which reflected partial injury. Original article includes photomicrographs and electron micrographs.

1709 **STUDIES ON THE PANCREATIC A_1-CELLS AND THEIR REACTIONS TO GASTRIN ADMINISTRATION.** *(E.)* Petersson, B. (Histol. Dept., U. Uppsala, Sweden). *Acta. Path. Microbiol. Scand.* 72(4):553-560, 1968.

Gastrin was administered to guinea pigs to test if regressive changes in A_1 cells of the pancreatic islets would occur, indicating that these cells are a source of gastrin. In order to differentiate the secretion granules of A_1, A_2, and B cells, pancreatic specimens from 6 male guinea pigs were dissected, fixed, mounted, silver-impregnated, and re-stained with a variety of granule stains. The use of Epon in imbedding the specimens is described. Gastrin was injected s.c. every 3 hr for 5 days in 9 male guinea pigs according to an increasing dose schedule (gastrin at 135 Leo (mfr.) U/2 ml of saline, pH 6.9, given at 50 µl in the first 24 injections, 75 µl in injections 25-38, and 100 µl in 39-41). Nine guinea pigs served as controls which received saline. The gastrin effect on islet cells was evaluated by caryometry after similar staining techniques were completed. In each animal, the areas of the largest optical cross-sections of 20 A_1, 20 A_2, and 20 B cells were calculated. No qualitative or quantitative changes were found in any of the 3 types of granulated islet cells.

1710 EFFECT OF RAW SOYBEAN FLOUR ON THE COMPOSITION OF RAT PANCREAS. *(E.)* Konijn, A. M. (Hadassah Med. Sch., Hebrew U., Jerusalem, Israel) and K. Guggenheim. *Proc. Soc. Exp. Biol. Med.* 126(1): 65-67, 1967.

In order to test for pancreatic hypertrophy and changes in cellular chemical composition after feeding raw soybean flour (sbf), young male Wistar rats (30-40 g) were fed the following diet for 3 weeks: 18% dietary protein supplied by sbf (either unheated raw sbf or commercially processed low-fat flour), cornstarch 73%, vegetable oil 5%, salt mixture 4%, and vitamins in mg/kg including thiamine 2.0, riboflavin 3.0, pyridoxine 1.6, calcium pantothenate 12.0, nicotinic acid 30.0, and choline chloride 1000. In addition, each rat received 100 IU vitamin A and 4 IU vitamin D 2 times a week. Rats on the raw sbf diet gained less weight and had enlarged pancreases which contained a lower concentration of DNA, methionine, and lysine, and a higher concentration of valine and threonine, than rats on the heated sbf diet, but both types showed similar concentrations of moisture, total lipids, protein and RNA. Hypertrophy rather than hyperplasia is indicated.

1711 PATHOGENESIS OF GASTRIC MICROCIRCULATORY AND MAST CELL CHANGES IN RESTRAINT STRESS. *(E.)* Guth, P. H. (California Coll. Med., Orange) and X. Kozbur. *Amer. J. Dig. Dis.* 13(6):530-535, 1968.

To determine the mechanism by which restraint stress produces mast cell and vascular changes, and a postulated causal relation, the relative blood content and mast cell concentration of superficial gastric mucosa were measured in restrained and unrestrained vagotomized rats, adrenalectomized rats, and drug-injected (urecholine, hydrocortisone, and epinephrine) rats.
In vagotomized animals, 4 hr of restraint significantly decreased the mast cell concentration, with no change in mucosal blood content and no gastric ulceration. A significant accumulation of blood in mucosal microvessels was observed in adrenalectomized rats; no change in mast cells or increased incidence of gastric ulcers was noted. Intraperitoneal injections of urecholine and epinephrine produced a significant increase in mucosal blood content with no significant change in mast cells; hydrocortisone significantly decreased mast cells, but did not change mucosal blood content. No causal relation was found between mucosal mast cell degranulation and mucosal hyperemia. It appears that adrenal corticosteroids are responsible for mast cell degranulation, while vagal discharge controls vascular alterations. The results present strong evidence against a direct role for mast cell degranulation in the pathogenesis of stress ulcers and suggests the importance of hyperemia in the genesis of restraint-induced ulcers.

1712 GROWTH OF THE PARIETAL CELL POPULATION IN THE GASTRIC MUCOSA OF BEAGLE DOGS. *(E.)* Sum, P. T. (Dept. Exp. Surg., McGill U., Montreal, Canada) and R. M. Preshaw. *Gastroenterology* 54(6):1050-1056, 1968.

Parietal cell populations of gastric mucosa were determined in 9 newborn, 6, 12, 18, and 24-week-old and 4 adult purebred beagles after sacrifice (pentobarbitone overdose) by Card and Marks' modification of the Cox and Barnes technique. The total number of parietal cells, the area of acid-bearing mucosa, and glandular mucosa thickness increased rapidly in the first 12 weeks of life; however, the number of parietal cells per cubic millimeter of glandular mucosa barely doubled between birth and maturity. It was demonstrated that parietal cell density provides little information about total parietal cell population.

1713 EFFECTS OF SEROTONIN ANALOGS ON SEROTONIN CONCENTRATION IN GASTROINTESTINAL TRACTS AND ON ARGENTAFFIN CELLS. *(Jap.)* Kozuka, M. (Nagoya City Univ. Med. Sch., Japan). *J. Nagoya City Univ. Med. Ass.* 18(3-4):393-409, 1968.

1714 MORPHOLOGICAL CHANGES OF THE RAT INTESTINE DURING REPRODUCTION. *(E.)* Penzes, L. (Res. Inst. Animal Husbandry, Budapest). *Anat. Anz.* 122(2):172-175, 1968.

1715 EFFECT OF SECRETIN STIMULATION ON THE ULTRASTRUCTURE OF THE EXOCRINE PANCREAS. *(It.)* Gasbarrini, G. (Inst. Path. Spec. Med., U. Bologna, Italy). *Minerva Gastroent.* 13(4):129-142, 1967.

1716 ULTRASTRUCTURAL STUDIES OF THE FUNCTIONAL CYCLE OF HUMAN GASTRIC MUCOSA CELLS AFTER PENTAGASTRIN STIMULATION. *(Ger.)* Dettmer, N. (1st Med. Clin., Lubeck Med. Acad., Germany). *Klin. Wschr.* 46(6):300-305, 1968.

1717 VARIATIONS IN PANCREATIC DUCT ANATOMY AND DUODENAL STUMP CLOSURE. *(Ger.)* Hentschel, M. (Surg. Clin., Free U. Berlin, Germany). *Chirurg.* 39(4):181-184, 1968.

1718 THE ULTRASTRUCTURAL LOCALIZATION OF ACID MUCOPOLYSACCHARIDES IN THE INTESTINE AFTER IRRADIATION. *(E.)* Berlin, J. D. (Battelle Mem. Inst., Richland, Washington). *Radiat. Res.* 34(2):347-356, 1968.

See also abstract no.: 2282

1719 **A GASTRIC FACTOR PROMOTING IRON ABSORPTION.** *(E.)* Murray, M. J. (Dept. Int. Med., U. Minnesota, Minneapolis) and N. Stein. *Lancet* 1(7543):614-616, 1968.

Samples of gastric juice from 12 healthy subjects (26-63 yr old, hemoglobin 12.8-16.3 g%, serum Fe 98-134 μg%), 8 patients with iron-deficiency anemia (34-71 yr old, hemoglobin 5.8-10.1 g%, serum Fe 13-25 μg%), and 4 patients with hemochromatosis (6-63 yr old, hemoglobin 11.9-13.6 g%, serum Fe 179-272 μg%) were administered (2 ml by stomach tube) to normal (sham-operated) and gastrectomized anemic (hemoglobin 9.0 g%) rats (adult, female Sprague-Dawley) in order to study the effect of gastric juice on the absorption of ^{59}Fe-labeled ferrous citrate (0.25 microcuries by stomach tube). Whereas gastric juice from the healthy controls had no significant effect on iron absorption, that from patients with iron-deficiency anemia and especially that from patients with hemochromatosis increased iron absorption markedly, particularly in gastrectomized anemic rats (32.4-41.5% absorption compared to 18.7% with normal juice, 5.5% with no juice, and 8.3-12.5% in sham-operated rats given gastric juice from patients with anemia or hemochromatosis). It is concluded that iron absorption proceeds without a gastric factor in the normal animal, but that a factor which promotes iron absorption is produced in the gastric juice during anemia or hemochromatosis.

1720 **STUDIES ON IRON ABSORPTION IN ACUTE LIVER DISEASE.** *(E.)* Brown, H. (Radcliffe Infirm., Oxford, England), S. T. Callender and J. S. Malpas. *Brit. Med. J.* 1(5595):799-801, 1968.

Absorption of ^{59}Fe-labeled ferrous sulfate or hemoglobin was not significantly affected by chemical liver damage (α-naphthylisothiocyanate, 10 mg/day with the diet) in experiments in 10 female Wistar rats or by pancreatic extract (2.5 g by mouth) in tests on 3 patients with hepatitis (1 viral and 2 lupoid). Among 8 patients (2 men and 6 women, 29-63 yr old) with hepatitis (6 probably viral and 2 lupoid) studied at various stages of their disease, iron absorption was in the lower range of normal in all cases except the 2 with lupoid hepatitis and 2 with iron deficiency. The serum iron tended to be high during the acute stages of hepatitis and fell with recovery. Steatorrhea in 5 patients could not be correlated with decreased iron absorption.

1721 **THE PATHOPHYSIOLOGY OF SMALL INTESTINAL ABSORPTION: THE PHENOMENON OF PERSORPTION.** *(Ger.)* Volkheimer, G. (1st Med. U. Clin., Charité Hosp., Berlin, Germany). *Aktuel. Kongr. Ber.* 2:61-75, 1967.

During a lecture presented at Bad Kissingen as part of the 17th Course in Postgraduate Medicine, the author reviewed the concepts of digestion, absorption, and transport and pointed out that these phenomena are related parts of a functional whole. Small intestinal absorption depends on passive diffusion, active transport, and cytopempsis or pinocytosis, all of which (except cytopempsis) require the prior metabolic breakdown of ingested foodstuffs to small molecular dimensions in the intestinal lumen. Carbohydrates, for example, can be absorbed only as monosaccharides, and deficiencies in the enzymes required for intestinal predigestion result in the various types of malabsorption, the etiology and treatment of which are briefly discussed. Yet, it is well known that cellulose particles, starch grains, pollen, spores, yeast cells, and similar material can penetrate into the body in undigested form. This penetration of solid particles (5-120 microns in diameter) through the epithelial layer of the intestinal mucosa, a process which takes place in between the cells rather than through the cells, is given the name "persorption." The ingestion of 200 g of corn starch, oats or wheat, for example, is followed by the appearance of 40-60 grains per 10 ml of venous blood within 1-2 hr, and significant numbers of starch grains can be seen as early as 10-15 min after ingestion. The rate of persorption is increased by caffeine or prostigmine and decreased by atropine or barbiturates, and seems to be affected primarily by the motor activity of the mucosa as well as by the physical properties of the particles. The further transport of starch grains which have been "persorbed" takes place mainly in the subepithelial layer of the intestinal mucosa and involves both chylous and portal mechanisms. Persorption can apparently take place anywhere from the cardia to the rectum (wherever the mucosa is covered by a single layer of epithelium), but is found primarily in the areas of epithelial desquamation and in segments with marked motor activity. Experiments in human subjects have shown a significant effect of age. Thus, although the persorption curves of corn and potato starch are about the same in young people, in older subjects only about half as many grains of corn starch appear in the blood (with a low maximum appearing at about the same time as the higher maximum in young people), while after ingestion of potato starch the maximum number of grains eventually appearing in the blood is the same as in young subjects, but persorption is delayed by about an hour. The precise mechanisms and significance of the phenomena of persorption remain unclear. It is suggested, however, that repeated microembolism of small capillaries by persorbed granules during life may contribute to their eventual degeneration and the manifestations of old age.

1722 **THE EFFECT OF HYPOPHYSECTOMY ON INTESTINAL GLUCOSE TRANSPORT IN THE RAT.** *(E.)* Zaccheo, T. J. (Tufts U. Med. Sch., Boston, Mass.) and R. Levitan. *Amer. J. Gastroent.* 49(4):349-354, 1968.

In experiments on male rats of the Charles River strain, using the everted sac technique of Wilson and Weisman, glucose transport across the small intestine *in vitro* was found to be stimulated by prior hypophysectomy. Following sacrifice 2 weeks after hypophysectomy, everted intestinal loops were suspended in oxygenated Krebs-Ringer bicarbonate at 37C (pH 7.4) and sacs were made starting at the ligament of Treitz. The interval from death to the preparation of the last sac was 15 min or less. The sacs were then filled with Krebs-Ringer bicarbonate-glucose and incubated for 30 min at 37C. Mean glucose transport was 0.04822-0.0638 mg glucose per mg dry weight per hour in sacs from normal rats and 0.112-0.133 mg glucose per mg dry weight per hour in sacs from hypophysectomized rats. These results conflict with those of *in vivo* absorption studies and with the anatomical changes observed in the small intestinal mucosa following hypophysectomy. It is pointed out that the basic unit (mg glucose transported per mg dry sac weight per hr) may not be strictly comparable in view of the decrease in weight of the mucosal layer, the decreases in height of the villi, and the irregular decreases in size of the crypts of Lieberkühn following hypophysectomy. The apparent increase in glucose transport may therefore be due to differences in the subepithelial space through which diffusion must take place, to differences in the rates of glucose metabolism or to inadvertent "stripping" of portions of the serosa and muscularis during preparation of the sacs.

1723 **THE "MORPHO-FUNCTIONAL ABSORPTION TEST" IN THE DUODENUM.** *(It.)* Gasbarrini, G. (Inst. Spec. Med. Pathol., U. Bologna, Italy). *G. Clin. Med.* 49(1):56-63, 1968.

In 5 normal human subjects, electron microscopy of biopsy specimens obtained from the duodenal mucosa after introduction of 100 ml of peanut oil (plus sodium taurocholate and Tween) or saline into the duodenal lumen by catheter revealed changes in the surface epithelium of the villi which were quite similar to those previously observed in the jejunum (i.e., accumulation of radioopaque lipid droplets near the Golgi apparatus, at the basal membrane of the villi and in the intercellular spaces of the basal epithelium). The only significant difference revealed between jejunum and duodenum was some decrease in lipid absorption and a marked increase in saline absorption (dilatation of the intercellular spaces) in the latter. These findings are interpreted as demonstrating the capacity of the duodenal mucosa for both active and passive absorption.

1724 **ELECTRICAL ACTIVITY ACROSS HUMAN FOETAL SMALL INTESTINE ASSOCIATED WITH ABSORPTION PROCESSES.** *(E.)* Levin, R. J. (Dept. Physiol., U. Sheffield, Yorkshire, England), O. Koldovský, J. Hošková, V. Jirsová and J. Uher. *Gut* 9(2):206-213, 1968.

The ontogeny of electrogenic hexose and amino-acid transfer systems in the small intestine was investigated *in vitro* using everted jejunal and ileal sacs prepared from human fetuses (12-21 weeks of gestation) removed by the vaginal route from healthy mothers. The endogenous potential difference (serosa + to mucosa) across the everted fetal jejunum was never greater than 1.5 mV, although it increased slightly with age. Addition of glucose to the mucosal fluid produced an increase in potential difference which reached a maximum at a glucose concentration of about 10-14 mM and varied (at saturation levels) from about 2.5 mV at 14.5 weeks of gestation to 5.5 mV at 16.5 weeks (anomalous decrease to 4 mV at 21 weeks). The apparent Km of glucose (resulting from a Lineweaver-Burke plot) varied between 1.2 and 5 mM. The glucose transfer potential difference was abolished by phlorrhizin (5 x 10^{-4} M) but was not markedly decreased by anoxia or by lowering the NaCl concentration (which reversed the sign of the endogenous potential difference). A potential difference was also produced by α-methylglucoside and sucrose but not by lactose, fructose or xylose. An amino-acid transfer potential difference of about 1.0-1.5 mV was produced by L-alanine but not by D-alanine. Similar results were obtained with fetal ileum. Both the endogeneous and the glucose transfer potentials were higher in specimens of adult ileum, but the L-alanine transfer potential was the same in fetal and adult ileum. It is of interest that the electrical properties of the human intestinal mucosa are more similar to those of the sheep and rabbit than to those of the chick.

1725 **OBSERVATIONS ON THE MECHANISM OF PERSORPTION.** *(Ger.)* Volkheimer, G. (Charité Hosp., Berlin, Germany), H. Wendlandt, W. Wagemann, P. Reitzig, D. Schneider, C. Böhm, M. Böhm, B. Eras, H. Gröning, G. Hauptmann, R. Hiller, H. Lorenz, A. Mandelkow and S. Strauch. *Path. Microbiol.* 31:51-58, 1968.

Histological studies on the gastrointestinal mucosa of rats after feeding of corn- and potato-starch suspensions or their administration by esophageal or rectal catheter revealed starch grains between the epithelial cells in areas of desquamation, as well as in the subepithelial zone of the villous mucosa and in the lymphatic ducts of the deeper mucosal strata and submucosa. Starch grains were found in the mucosa of both the small and large intestine. Persorption seems to be favored by interruptions in the continuity of the epithelium or in the contact between the epithelial cells and the basal membrane, as well as by intestinal motility and the pulsation of the blood vessels. Following persorption, the particles are transported into the deeper layers where they eventually enter either the capillaries or the small lymphatic ducts.

1726 **A METHOD FOR MEASURING THE GASTROINTESTINAL ABSORPTION OF ^{47}Ca USING ^{47}Sc AS AN INERT MARKER.** *(E.)* Ogg, C. S. (St. Philip's Hosp., London, England), J. D. Pearson and N. Veall. *Clin. Sci.* 34(2):327-332, 1968.

This method relies on the fact that the daughter isotope ^{47}Sc, produced by the radioactive decay of ^{47}Ca, is not absorbed by the gastrointestinal tract, thus eliminating the need for an additional inert marker such as ^{51}Cr. Following oral administration of labeled $CaCl_2$ containing a known proportion of ^{47}Sc (which can be calculated from the rate of decay and the known time interval between separation of Ca from Sc and administration of the mixture to the patient), the absorption of Ca can be estimated from the change in the Sc/Ca ratio in the intestinal contents, thus making possible an accurate measurement of calcium absorption in ambulatory patients regardless of the loss of feces. The amount of ^{47}Ca administered also does not have to be known exactly, the only requirement being that one of the several stool specimens which might contain 5% or more of the administered dose be available for analysis. ^{47}Sc is removed from the labeled calcium solution by treatment with $FeCl_3$ and ammonia, after which the calcium solution is allowed to stand for an accurately measured 2-3 days before use. A homogenized specimen of feces obtained during the first 2-3 days after administration of the known proportion of ^{47}Ca and ^{47}Sc is then counted both in a well-type scintillation counter, with the discriminator level set to exclude radiation from ^{47}Sc, and with a pulse-height analyzer set up to record the 0.16 meV rays of ^{47}Sc. The percent absorption of Ca is then given by

$$\frac{100(F_{Sc}-F_{Ca}R_S)}{(F_{Sc}-F_{Ca}R_S)+f_1f_2F_{Ca}R_S}$$

where F_{Sc}

and F_{Ca} are the counted activity due to scandium and calcium, resp., in the fecal sample, f_1 and f_2 are the decay factors for ^{47}Sc alone and in equilibrium with ^{47}Ca, resp., for the time interval between the time of counting and 2 hr after the time of administration, and R_S is the ratio between the activities of Sc and Ca in the dose solution. In 40 fasting subjects (33 patients with renal disorders and 7 healthy volunteers), calcium absorption was studied by both the ^{47}Sc test and by total collection of the feces over a 6-day period (amount of Ca absorbed = amount administered - amount excreted). The results obtained by the two methods showed a correlation of $r = 0.94$, $P < 0.001$, and the standard deviation of duplicate measurements by the ^{47}Sc technique was ± 2.8% of the administered dose. It is suggested that more accurate results could be obtained by allowing the ^{47}Ca to decay for 6-7 days before administration, so that the excess Sc activity for a given fractional absorption of Ca would be maximal.

1727 ABSORPTION THROUGH UNSTIMULATED AND SECRETING CANINE OXYNTIC GLANDULAR MUCOSA. *(E.)* Davenport, H. W. (Dept. Physiol., U. Michigan, Ann Arbor), W. S. Rehm and B. F. Overholt. *Proc. Soc. Exp. Biol. Med.* 126(3):841-844, 1967.

Rates of absorption by passive diffusion of ethanol, thiopental, and salicylic acid (uncharged in acid solution) across the oxyntic glandular mucosa of the vagally denervated Heidenhain pouch of 3 unanesthetized dogs were measured under unstimulated, nonsecreting conditions, and maximally stimulated secreting conditions induced by s.c. injection of histamine and gastrin pentapeptide. Results showed no statistically significant difference between the absorption constants for the unstimulated and stimulated condition. It was concluded that the high rate of flow of water out of the mucosa when secreting does not reduce the rate at which substances can diffuse passively into the mucosa. The glandular tubules in which the rate of flow of water is greatest are not an important site of absorption due to the dilution effect of secretion.

1728 STARCH AND IRON ABSORPTION. *(E.)* Garretson, F. D. (Walter Reed Army Inst. Res., Washington, D. C.) and M. E. Conrad. *Proc. Soc. Exp. Biol. Med.* 126(1):304-308, 1967.

The effect of starch ingestion upon iron absorption in rats was studied in order to clarify the epidemiology of "starch eaters anemia" (the ingestion of laundry starch by Negro females in areas of the U.S.). Male albino rats (W.R.C.F. strain, 140-200 g weight) were fed the following diets with unrestricted intake: 1) a normal diet composed of g/100 g amounts of protein 25, cholesterol 53, fat 10, and iron 0.009, with additives in varying combinations such as casein 27, starch 60, corn oil 10, or sucrose 60; 2) a starch diet; 3) a sucrose diet; 4) a starch casein diet. The latter 3 diets were low in protein, but all had an equal amount of iron (0.009 g/100 g). Iron absorption studies were performed using ferrous^{59} citrate as well as microhematocrit determinations and determinations of serum iron and iron binding capacity. Decreased iron absorption was observed in rats fed protein deficient starch and sucrose diets. This was not caused by a direct intraluminal effect of starch or sucrose upon iron absorption. The abnormality was attributed to both a retarded rate of growth and a relative deficiency of protein for hemoglobin synthesis. This latter factor correlates with the anemia in humans.

1729 ALCOHOL ABSORPTION RATE FROM DIFFERENT PARTS OF THE GUT. *(E.)* Elmslie, R. G. (U. New South Wales, Sydney, Australia) and N. Harvey. *Quart. J. Stud. Alcohol* 29(2):308-312, 1968.

Uptake of alcohol from the temporarily isolated stomach, small intestine, and colon was studied in 6 lean healthy adult mongrel dogs. A series of 3 experiments was performed on each dog using i.v. nembutal and nitrous oxide anesthesia. In the first experiment of each series, the gastroduodenal junction was temporarily occluded by a noncrushing clamp and the alcohol (75 ml of 20% alcohol v/v with water, at 20 cm pressure over 2 minutes) was instilled via gastrostomy; in the second, both the gastroduodenal and the ileocolic junctions were occluded and the alcohol instilled into the duodenum; in the third, the ileocolic junction was occluded and alcohol was instilled into the proximal colon. Venous blood samples were taken before and at 10-min intervals after the instillation of the alcohol for 1 hr. Differences in blood alcohol levels were a statistically reliable index of alcohol uptake. It was assumed in these experiments that the distribution and elimination rates of alcohol in a given dog are constant. Blood alcohol levels rose slowly after gastric instillation. Blood levels were significantly higher after small intestinal and colonic instillation than after gastric instillation. There was no significant difference between mean blood alcohol levels after colonic and small intestinal instillation.

1730 EFFECT OF PANCREATIN ON THE ABSORPTION OF Fe^{59} IN RATS WITH FATTY LIVER. *(E.)* Murray, M. J. (U. Minnesota Med. Sch., Minneapolis) and N. Stein. *Amer. J. Dig. Dis.* 13(6):527-529, 1968.

Choline-deficient diets produced fatty liver in 53 female Sprague-Dawley rats (150 g) used to study the effects of pancreatin on ^{59}Fe uptake. The isotope was given as a test dose and the animals were fasted overnight; the next morning each rat was given an intragastric dose of 0.25 μC of ^{59}Fe as ferrous citrate with 0.25 mg of ferrous citrate as a carrier. The test diets were started immediately thereafter. The animals were divided into 4 groups: group I was maintained on diet only; group II received the diet and pancreatin (2 g/day); group III received the diet and bromelin (2 g/day), a proteolytic enzyme of vegetable origin; and group IV received choline (12 mg) and iron (50 μg of ferrous citrate). No significant depression in iron absorption was observed in any group of animals. Pancreatin has no effect on ^{59}Fe uptake in rats with choline-deficiency-induced fatty liver.

1731 LIPID ABSORPTION IN ADRENALECTOMIZED RATS: THE ROLE OF ALTERED ENZYME ACTIVITY IN THE INTESTINAL MUCOSA. *(E.)* Rodgers, J. B. (Harvard Med. Sch., Boston, Mass.), E. M. Riley, G. D. Drummey and K. J. Isselbacher. *Gastroenterology* 53(6):547-556, 1967.

The effects of adrenalectomy on lipid absorption was studied in female Charles River rats by using ^{14}C-labeled lipid-albumin suspensions. Enzymatic activity of fatty acid thiokinase, monoglyceride acylase, and diglyceride acylase was significantly greater in the controls than in the adrenalectomized rats. The mean uptake of ^{14}C palmitic acid per 100 mg wet weight of intestinal slices was essentially the same in the 2 groups, but the esterification of ^{14}C palmitic acid was significantly decreased in the adrenalectomized animal tissue. Control rats absorbed a mean of 88.4% of the administered lipid in 24 hr while the adrenalectomized rats absorbed a mean of 79.9% (statistically significant). These studies indicate that adrenal corticosteroids influence lipid absorption by rat small intestine.

1732 GASTRIC ABSORPTION OF IRON. *(E.)*

Dagg, J. H. (U. Washington Sch. Med., Seattle), I. N. Kuhn, F. E. Templeton and C. A. Finch. *Gastroenterology* 53(6):918-922, 1967.

Observations of gastric iron absorption were made in healthy volunteers (age 20-30 years) and in patients with iron deficiency anemia, treated pernicious anemia, malabsorption syndrome, idiopathic hemochromatosis and cutaneous hepatic porphyria. Forty-five min after intramuscular administration of 15 mg of propantheline bromide, the subject was placed on his left side with the head end of the table lowered 30°. Five mg of radioiron (as ferrous ascorbate), 2.5 g of Barotrast contrast medium, and water were given via a drinking straw (total volume 50 ml). After 2 hr, 500 mg of desferrioxamine methane sulfonate was given to chelate any unabsorbed iron in the stomach. Abdominal X-rays were used to monitor the passage of barium to the duodenum. Intestinal absorption was studied without the chelating agent. In all subjects, less than 2% of the dose was absorbed, suggesting that food iron absorption from the stomach is insignificant. No reciprocal relationship between the dose of iron administered and the percentage absorbed was found, suggesting that what absorption does occur is the result of passive diffusion across the mucosa.

1733 INHIBITION OF INTESTINAL IRON TRANSPORT INDUCED BY TETRACYCLINE. *(E.)*

Greenberger, N. J. (Ohio State U. Coll. Med., Columbus), R. D. Ruppert and F. E. Cuppage. *Gastroenterology* 53(6): 590-599, 1967.

The role of protein bound iron in iron absorption was studied in intestinal loops and everted duodenal sacs from female Wistar rats with radioiron. The antibiotic protein synthesis inhibition effect on iron absorption revealed a significantly decreased mucosal to serosal transfer of radioiron. The inhibitory effects of tetracycline were dose-dependent and were observed only after large doses (400 mg per kg). It is suggested that the inhibitory effects of tetracycline are due in part to inhibition of protein synthesis.

1734 SODIUM TRANSPORT BY HUMAN ILEUM *IN VITRO* AND ITS RESPONSE TO CHOLERA ENTEROTOXIN. *(E.)*

Grady, G. F. (Tufts U. Sch. Med., Boston, Mass.), M. A. Madoff, R. C. Duhamel, E. W. Moore and T. C. Chalmers. *Gastroenterology* 53(6):737-744, 1967.

Normal terminal ileum segments from 9 patients were used to study sodium transport and the effects of cholera enterotoxin on sodium transport. Radiosodium was used in the short circuit current studies of net sodium flux between serosa and mucosa. The sodium transport was not inhibited by crude filtrates of *Vibrio cholera* or by partially purified cholera toxin capable of inducing profound diarrhea.

1735 STUDIES OF INTESTINAL MICROFLORA. IV. THE MICROFLORA OF ILEOSTOMY EFFLUENT: A UNIQUE MICROBIAL ECOLOGY. *(E.)*

Gorbach, S. L. (Tufts U. Sch. Med., Boston, Mass.), L. Nahas, L. Weinstein, R. Levitan and J. F. Patterson. *Gastroenterology* 53(6):874-880, 1967.

Intestinal microflora was studied in the ileostomy effluent from 13 patients, normal terminal ileal contents from 7 subjects, and feces from 30 subjects, all 20-40 years old. Unrestricted diets and no medications were given during the period of investigation. Serial 10-fold dilutions were studied. One ml of the appropriate dilution was pipetted to the media and the cultures were incubated both aerobically and anaerobically. There were 25 times as many bacteria per g of feces as in the same amount of ileostomy effluent. In feces, Bacteroides comprised 99% of the total organisms and coliforms comprised about 1% of the total count. Ileostomy effluent contained fewer anaerobes by a factor of 25. The total count from ileostomy effluent was about 80 times greater than that of the normal terminal ileum contents. These studies suggest that the ileostomy effluent re-represents a unique ecology distinct from normal terminal ileal contents or feces.

1736 THE ABSORPTION OF LONG-CHAIN FATTY ACIDS FROM THE SMALL INTESTINE OF THE SHEEP. *(E.)*

Lennox, A. M. (Rowett Res. Inst.,Bucksburn, Aberdeen, Scotland) and G. A. Garton. *Brit. J. Nutr.* 22(2):247-154, 1968.

A rumen cannula and 2 pairs of exit-entrant cannulas were fitted in different parts of the small intestine of 3 sheep. Exit and entrant cannulas were located at the following distances from the common bile duct in the 3 respective experimental sheep: 0.5 and 2.5 m, 2.5 and 8.5 m, and 0.5 and 15.5 m. It was thus possible to obtain samples representative of the upper jejunum, jejunum, and almost entire length of intestine. Diet consisted of dried grass cubes or hay plus linseed meal and oats, and an aqueous solution of polyethylene glycol (PEG) was infused continuously into the rumen. Total lipids were extracted from chyme samples and fractionated into unesterified fatty acids, neutral lipids and phospholipids. Samples were analyzed for PEG content, thus providing an index of the extent of water absorption. Combined with flow-rate data, calculations of uptake of unesterified and esterified fatty acids were carried out. Data indicate that uptake and hydrolytic release of esterified fatty acids were almost complete at the level of the jejunal-ileal junction. There were no gross differences in the overall composition of the unesterified and esterified fatty acids at the different levels, and it appeared that C$_{18}$ mono-unsaturated acid was absorbed somewhat more efficiently than palmitic and stearic acid.

1737 ABSORPTION OF ^{212}Pb FROM THE GASTROINTESTINAL TRACT OF MAN. *(E.)*

Hursh, J. B. (Dept. Radiation Biol. Biophys., U. Rochester, N. Y.) and J. Suomela. *Acta Radiol. [Ther.]* 7(2):108-120, 1968.

In order to calculate the radiation hazard from ingestion of lead isotopes, a determination was made of the fractional amount which is absorbed from the gastrointestinal tract. Absorption on administration of ^{212}Pb by mouth to 3 human subjects (ages 59, 40, 27 yr) was found to be 1.3, 8.1, and 16.0%, resp. The absorption was determined by a comparison of the 24-hr urinary excretion with the average excretion in the same period by 2 subjects (ages 59, 39 yr) who received the isotope i.v. Age was a factor in the wide range of absorption values, increasing age being associated with decreased absorption. The overall average value was 8%, a figure which may not be conservative for an appreciable fraction of the population. The ^{212}Pb concentrations in the erythrocytes as a function of time after oral or i.v. administration suggest that lead may be released from binding sites only when the cell dies. The effect of this on permissible intake values of stable lead is considered.

1738 **OBSERVATIONS ON THE NATURE AND ORIGIN OF LIPIDS IN THE SMALL INTESTINE OF THE SHEEP.** *(E.)* Lennox, A. M. (Rowett Res. Inst., Bucksburn, Aberdeen, Scotland), A. K. Lough and G. A. Garton. *Brit. J. Nutr.* 22(2):237-246, 1968.

Total lipids were extracted from intestinal contents taken from the rumen, abomasum, and jejunum of 4 slaughtered sheep and were fractionated into unesterified fatty acids, neutral lipids, and phospholipids. The proportion of phospholipids in the total fatty acid content increased in the jejunum, as compared to levels in the rumen and abomasum, apparently due to the presence of biliary phospholipids. Total lipids and conjugated bile acids were extracted from sheep bile, the lipids were fractionated, and their fatty-acid composition was determined. Phospholipids predominated and these consisted mainly of phosphatidylcholine, with some lysophosphatidylcholine. Total lipids and conjugated bile acids were extracted from samples of the intestinal contents obtained by cannulas from different positions in the jejunum of 3 sheep. Analysis of the lipids indicated that biliary phospholipids, especially phosphatidylcholine, underwent progressive hydrolysis in the intestinal lumen. The distribution of conjugated bile acids, unesterified fatty acids, and phospholipids in the solid (particulate) and liquid (micellar) phases of the intestinal contents was determined to be associated primarily with the particulate matter, and therefore only a small fraction of the total fatty acids appears to be available for absorption in micellar form. Micellar solubilization of fatty acids may be facilitated by lysophosphatidylcholine.

1739 **INHIBITION OF STRONTIUM AND CALCIUM UPTAKE BY RAT DUODENAL SLICES: COMPARISON OF POLYURONIDES AND RELATED SUBSTANCES.** *(E.)* Patrick, G. (MRS Radiobiol. Res. Unit, Harwell, Berkshire, England). *Nature* 216(5117): 815-816, 1967.

1740 **THE HUMAN COLON: ITS STUDY AND ABSORPTIVE FUNCTIONS.** *(Rev.)(E.)* Levitan, R. (Tufts U. Med. Sch., Boston, Mass.). *Israel J. Med. Sci.* 4(1):140-145, 1968.

1741 **THE PHENOMENON OF PERSORPTION AND ITS IMPORTANCE IN ALLERGOLOGY.** *(Rev.)(Fr.)* Volkheimer, G. (Charité Hosp., Berlin, Germany), F. H. Schulz, H. Wendland and E. D. Hausdorf. *Maroc Med.* 47(506):626-633, 1967.

1742 **STUDY OF THE ORIGIN OF THE NITROGEN COMPOUNDS IN THE CECUM OF GERM-FREE RATS USING LABELED AMINO ACIDS.** *(Fr.)* Combe, E. (Metab. Lab., I.N.R.A., Theix, France), M. Arnal and E. Sacquet. *C. R. Soc. Biol. (Paris)* 161(5):1076-1079, 1967.

1743 **LIPID COMPOSITION OF THE FECES OF NORMAL SUBJECTS ON FAT-FREE DIET.** *(It.)* Salvioli, G. F. (Inst. Gen. Clin. Med., U. Modena, Italy) and P. Levoni. *Minerva Gastroent.* 13(4):142-145, 1967.

1744 **IRON UPTAKE IN THE SMALL INTESTINE AS AFFECTED BY COMPLEXING WITH 8-HYDROXYQUINOLINE AND ITS SULFATE: PERFUSION STUDIES IN HUMAN JEJUNUM.** *(Ger.)* Ewe, K. (2d Med. Clin., Saarland U., Homburg, Germany). *Klin. Wschr.* 46(6): 296-300, 1968.

1745 **INTESTINAL INSULIN CLEARANCE. DUODENAL CLEARANCE OF ^{131}I-TAGGED INSULIN IN EXPERIMENTAL ENTEROPATHY IN THE RAT: PRELIMINARY NOTE.** *(It.)* D'Addabbo, A. (Inst. Gen. Clin. Med. & Ther., Bari U., Italy), A. Muscogiuri, G. Fanfani and V. Damato. *Minerva Med. Siciliana* 13(1):123-126, 1968.

1746 **COMPARATIVE EVALUATION OF METHODS FOR STUDYING ABSORPTION IN THE LARGE INTESTINE.** *(Rus.)* Vinogradova, M. A. (All-Union Sci. Res. Inst. Gastroent., Ministry of Health USSR, Moscow) and A. A. Makeeva. *Lab. Delo.* (3):151-153, 1968.

See also abstract nos.: 1824,1825,1870,2284

1747 FACTORS INFLUENCING GASTRIC SECRETORY DEPRESSION IN ACUTELY HYPERCARBIC RATS. *(E.)* Breen, J. J. (Minneapolis, Minn.), W. P. Ritchie, Jr., J. P. Delaney, C. Matson and O. H. Wangensteen. *Surgery* 63(5):816-821, 1968.

In order to elucidate the mechanism of the inhibitory effect of inhalation of 20% CO_2 on the gastric secretory response to ligation of the pylorus, the effects of prior adrenalectomy and the alterations in plasma volume, blood pressure, pulse rate, pulse pressure, cardiac output and blood flow to the stomach and adrenals were determined in adult male Sprague-Dawley rats. Adrenalectomy *per se* (3 weeks before pyloric ligation) produced a significant decrease in gastric secretion, but inhalation of 20% CO_2 + 20% O_2 + 60% N_2 by adrenalectomized rats for 4 hr produced a further significant decrease, indicating that the adrenals probably have little to do with the effect of hypercarbia. In normal rats, inhalation of the 20% CO_2 gas mixture led to an increase in blood pressure (by 30 mm Hg) and pulse pressure (by 10 mm Hg) but a decrease in cardiac output (from 155.1 cc/min in controls to 59.6 cc/min), pulse rate (from 450 to 250/min), arterial blood pH (from 7.31 to 6.87) and gastric blood flow. There was no significant effect on serum electrolytes, plasma volume, or blood flow to the esophagus and duodenum. Although adrenal blood flow was reduced compared to controls, the proportion of blood flowing to the adrenals was increased. Hypercarbia thus seems to produce a selective increase in gastric vascular resistance, which is reflected in decreased gastric secretion.

1748 QUANTITATIVE ASPECTS OF SYNERGISM AND INHIBITION OF GASTRIC ACID SECRETION. *(E.)* Makhlouf, G. M. (U. Alabama Med. Ctr., Birmingham), J. P. A. McManus and J. R. Knill. *Gastroenterology* 54(4):532-537, 1968.

Dose-response curves for the effect of single i.v. injections of gastrin II (0.006-1.5 μg/kg) on gastric acid secretion were obtained in two normal men. At all doses of gastrin, the peak output was obtained during the 2nd 10-min collection, and the dose-response curves in the two subjects were superimposable, both on each other and on a previously proposed model of secretion. The ED_{50} for subcutaneous gastrin was found to be 3 times as high as for intravenous gastrin. In one subject, dose-response curves were also obtained for intravenous gastrin (2-25 μg) preceded (20-30 min earlier) by the s.c. injection of mechothane (carbaminoyl β-methylcholine chloride, 5 mg), histamine acid phosphate (4 μg/kg) or atropine sulfate (0.4 mg). These dose-response curves showed an equally good fit to the model and revealed significant synergism between gastrin and mechothane or histamine and antagonism between gastrin and atropine, the inhibitory effect of which could not be overcome completely by near-maximal doses of gastrin. A plot of the reciprocal response versus the reciprocal dose yielded straight lines with varying slopes but identical intercepts on the response axis (the reciprocal of the maximal response). Linear regression equations calculated from this data showed that the ED_{50} for gastrin alone was 4.10 μg, compared to 1.58 μg for gastrin following histamine, 3.00 μg for gastrin following mechothane, and 10.50 μg for gastrin following atropine, but that the calculated maximal response was about 40 mEq of acid per hr regardless of the drugs administered. It is concluded that the maximal secretory capacity in man is a characteristic of the target organ itself (i.e., the number of available secretory units) and is independent of the nature of the stimulant or the presence of synergists or inhibitors. Analysis of published human data suggests that similar conclusions apply to histamine.

1749 GASTRIC SECRETION AND ANTICHOLINERGIC DRUGS. *(E.)* Caridis, D. T. (U. Aberdeen, Scotland) and G. Smith. *Brit. J. Surg.* 55(3):185-189, 1968.

In 24 patients with radiologically demonstrated duodenal ulcers, i.v. injections of atropine sulfate (0.6 mg; from 210 min before to 90 min after the start of the histamine infusion) had no significant effect on gastric acid secretion in response to histamine (0.04 mg/kg/hr), although pepsin secretion was markedly reduced. In 12 other ulcer patients, i.m. injection of hexamethonium bromide (25 mg 90 min after the start of the histamine infusion) did inhibit histamine-stimulated gastric acid and pepsin secretion (5.8-57.8% decrease in acid output and 39.6-75.3% decrease in pepsin), but there was also a marked drop in blood pressure and increase in pulse rate. This drop in blood pressure could be corrected by i.v. infusion of 6% Macrodex in saline, a procedure which had no effect *per se* on histamine-stimulated gastric secretion (2 patients). When hexamethonium bromide was combined with infusion of Macrodex in such a way that the drop in blood pressure was prevented (6 patients), there was also no significant effect on gastric acid secretion, although the pepsin output was still decreased by 8.7-30.5%. It is concluded that neither atropine nor hexamethonium bromide in the doses used is of value in predicting the probable benefit to be derived from vagal denervation of the stomach in patients with duodenal ulcer.

1750 EFFECTS OF THE DUODENAL EXTRACT AND SECRETIN ON GASTRIC SECRETION. *(E.)* Konaka, K. (Kumamoto U. Med. Sch., Japan), T. Yasumitu, T. Shudo and M. Okabe. *Kumamoto Med. J.* 20(4):178-184, 1967.

In experiments on mongrel dogs with gastric fistulas, i.v. injection of hog duodenal extract (0.1 mg/kg), the precise composition of which had not yet been determined, had no significant effect on either basal gastric secretion or gastric secretion stimulated by intravenous histamine (50 μg/kg). Gastric secretion which was stimulated by insulin (1.0 U/kg i.v.) was inhibited by intravenous duodenal extract but not by subcutaneous duodenal extract. Purified secretin (3.0 U/kg) was found to inhibit insulin-stimulated gastric secretion if it was given 5 min after the insulin (1.0 U/kg), but not if the secretin was given before the insulin. It is suggested that the duodenal mucosa contains inhibitory factors which may play a role in the control of gastric secretion.

1751 THE EFFECT OF PORTACAVAL SHUNTING ON THE EXOCRINE PANCREATIC MAXIMUM SECRETORY CAPACITY: PANCREATIC INFLUENCES IN

POSTPORTACAVAL SHUNT PEPTIC ULCER DIATHESIS.

(E.) Ashikari, H. (Mt. Sinai Med. Sch., New York City) and D. A. Dreiling. *Amer. J. Gastroent.* 49(4):312-317, 1968.

In 8 Thomas-fistula dogs, the maximum secretory capacity of the pancreas as determined by the flow and secretion of bicarbonate and enzyme in response to 5 U/kg of secretin and/or pancreozymin i.v. was consistently and significantly decreased 7-10 days after end-to-side portacaval shunting. There was an average 28% decrease in volume, 34% decrease in bicarbonate, and 33% decrease in amylase secretion, even though there was no visible alteration in pancreatic histology. It is hypothesized that this inhibition of pancreatic secretion could be due to partial vagal denervation or to a change in visceral blood flow patterns with a decrease in flow through the pancreas. Whatever the cause, the resultant loss of neutralizing capacity in the duodenum may be a factor in the pathogenesis of post-shunt peptic ulcer diathesis.

1752 COMPARISON OF INTRAVENOUS AND SUBCUTANEOUS SECRETIN IN DOGS. *(E.)*

Vagne, M. (U.C.L.A. Sch. Med., Los Angeles, Calif.) and M. I. Grossman. *Gastroenterology* 54(5):907-912, 1968.

The pancreatic response to a highly purified secretin (Gastrointestinal Hormone Laboratory, Karolinska Institute, Stockholm) administered subcutaneously and intravenously was compared in 3 unanesthetized dogs with gastric and pancreatic fistulas. The gastric fistula diverted all of the gastric juice from the duodenum, thus preventing the release of endogenous secretin. With respect to both the volume of pancreatic juice and the bicarbonate output, the peak response per 15 min was higher after i.v. administration (being essentially the same after 32 units i.v. as after 100 units s.c.), but the duration of action was twice as long after s.c. administration and the total response was therefore greater when the secretin was given s.c. (25 units s.c. yielded about the same total output as 32 units i.v.). The slope of the dose-response curve to s.c. secretin was steeper than that to i.v. secretin. The protein concentration of the pancreatic juice decreased after injection of secretin by either route. This decrease was similar to that seen with other preparations and was related to the volume flow rate of the pancreatic juice. These results, which indicate that pure secretin is a highly effective stimulant of pancreatic secretion by the subcutaneous route, are in marked contrast to those reported with Vitrum secretin which is essentially inactive when given s.c.; this difference is unexplained but may be related to the presence of an impurity which prevents diffusion of secretin from the subcutaneous space into the blood.

1753 THE EFFECT OF ALLOXAN UPON CANINE EXOCRINE PANCREATIC SECRETION. *(E.)*

Tiscornia, O. M. (Mt. Sinai Hosp., New York City), H. D. Janowitz and D. A. Dreiling. *Amer. J. Gastroent.* 49(4):328-340, 1968.

Sequential studies of pancreatic secretion in response to i.v. secretin and pancreozymin (5 U/kg of each) were carried out on 11 female Thomas-fistula dogs following administration of alloxan (50 mg/kg i.v.). Alterations in rate of flow and in output of bicarbonate and enzyme were remarkably parallel and consistent from animal to animal, although the time-schedule varied. Alloxan administration was followed by an immediate increase in pancreatic secretion, followed by a decrease lasting several days and then recovery to normal values by the end of the first week. This was followed by a prolonged and marked decrease (reaching 55-77% by about the 30th day), after which pancreatic function returned to normal gradually and even reached 129-155% of normal levels during the 8th week after alloxan. These changes in secretory function could be correlated with an initial inflammatory reaction followed by mild necrosis, deposition of glycogen in the pancreatic tubules, and eventual tubular reduplication. The pancreas was macroscopically normal at autopsy in 10 of 11 dogs. Although all became diabetic after alloxan, there was no correlation between pancreatic function and the blood sugar. Since the bicarbonate concentration tended to decrease while the amylase concentration increased as the overall output fell, it is suggested that the decrease in flow is due to a decrease in the elaboration of an electrolyte solution by the ductular system. Alloxan is known to damage the ductular system, and these changes in rate of flow and output of bicarbonate and enzyme support, although they do not prove, involvement of the ductular system in the elaboration of fluid and electrolytes.

1754 APPARENT KINETICS OF HISTAMINE DOSE-RESPONSIVE GASTRIC WATER AND ELECTROLYTE SECRETION IN THE DOG. *(E.)*

Hirschowitz, B. I. (U. Alabama Med. Ctr., Birmingham). *Gastroenterology* 54(4):514-522, 1968.

In 10 conscious fasted dogs with gastric fistulas in which there was no basal acid secretion, histamine was infused at doses of 2-125 μg/kg/hr for 4.5 hr and the gastric juice produced was analyzed for acidity and the content of sodium, potassium, chloride and pepsin in order to study the kinetics of gastric secretion. Each dose level was administered to each dog for separate 4.5-hr periods in the course of 5 yr. It was found that histamine-stimulated gastric secretion can be represented by a first-order reaction which is rate-limiting, or perhaps by a series of first-order reactions. A threshold dose of histamine of about 2.5 μg/kg/hr did not participate directly in stimulating the secretion of water, acid, chloride or potassium, but there was no threshold for the secretion of sodium, which was released in larger than predicted amounts at low histamine doses. The sodium output only increased about 3-fold with increasing histamine levels, however, compared to a 30-fold increase for the other electrolytes. At the other end of the scale, doses of 50-125 μg/kg/hr all yielded apparent maxima for water and electrolyte secretion and minima for pepsin. The pepsin output fell progressively with increasing histamine dosage, yielding a curve which was the mirror image of the acid secretion. Even at the highest rates, however, pepsin output was only 16-20% of that in the same dogs stimulated vagally by insulin or 2-deoxyglucose. The dose of histamine which yielded 50% of the calculated maximal secretion was found to be 14.2-15.3 μg/kg/hr for water, acid, chloride and potassium, and 9.4 μg/kg/hr for sodium.

1755 HISTAMINE DOSE RESPONSES IN GASTRIC FISTULA DOGS--DECREASING SECRETION WITH TIME. *(E.)*

Hirschowitz, B. I. (U. Alabama Med. Ctr., Birmingham). *Gastroenterology* 54(4):523-531, 1968.

In 10 dogs studied over a 5-yr period, 8 different dose levels of histamine (2-125 μg/kg/hr) were infused i.v. for 4.5-hr periods and the gastric juice produced was analyzed for acidity, chloride, sodium, potassium, osmolality and pepsin content. At the lowest dose, secretion was delayed for 1-1.5 hr, but at all other doses (6.25-125 μg/kg/hr) secretion began in 10-13 min. The output of water, however, decreased markedly at all doses during the last 2.5-3 hr of the 4.5-hr period. The potassium concentration also decreased, and although there was a slight increase in osmolality and the concentrations of acid, sodium and chloride with time, the net effect was a significant decline in the output of acid and electrolytes during the last 2.5 hr of each period. This decrease in gastric secretion with time may be the explanation for the apparent inhibition of gastric secretion by so-called supramaximal doses of histamine or gastrin in the conventional one-sitting dose-response study in which the dose is doubled every hour. Although the output of acid, chloride and potassium reached maximal values in 45-60 min, sodium output was high in the first 30 min and the decline was slower than for the other electrolytes. The actual rate of sodium secretion was about twice as high in the first few minutes, which is ascribed to the initial effect of histamine on the parietal cell; the first 0.25 mEq of sodium, however, probably represents the sodium content of the crypt fluid in the resting stomach before stimulation. The pepsin concentration was very low in these studies (15-90 U/ml), although it increased 300-400% during the last 3 hr of each period; the pepsin output was inversely related to the dose of histamine, with an early peak at 30-45 min and a late rise when the increase in concentration more than compensated for the decline in volume.

1756 HOMEOSTATIC CONSEQUENCES OF GASTRIC WATER, ACID, AND ELECTROLYTE SECRETION IN THE DOG.

(E.) Hirschowitz, B. I. (U. Alabama Med. Ctr., Birmingham). *Gastroenterology* 54(5): 887-897, 1968.

It is pointed out that the losses of fluid and electrolytes as a result of histamine-stimulated (2-125 μg/kg/hr i.v. for 4.5 hr) gastric secretion in conscious dogs with gastric fistulas may represent 6% of the total body water and 20% of the extracellular fluid, accompanied by 25% of the chloride and potassium of the extracellular fluid and an exchange of hydrogen ions for bicarbonate. These demands on the homeostatic mechanisms of the body are reflected in alterations in the composition of the plasma and gastric juice during the course of stimulated secretion. In the same 10 dogs used for previously reported studies, gastric juice output was 36-924 ml/4.5 hr, depending on the dose of histamine. Maximal secretion was accompanied by a 20% increase in hematocrit, a decrease in plasma chloride and potassium proportional to the amounts lost, and an increase in osmolality of up to 16.6 milliosmoles/kg. Thus, even though gastric juice is hypertonic, the exchange of hydrogen ions for bicarbonate makes gastric secretion equivalent to the loss of hypotonic fluid from the body. All of the water, chloride and potassium of the gastric juice derive ultimately from the extracellular fluid, and an amount of sodium about equal to the amount of acid secreted leaves the extracellular fluid to enter the cells together with about 67% of the bicarbonate produced by secretion. The secondary effects of these body fluid changes on the gastric juice include increases in the concentrations of sodium, hydrogen and chloride ions and decreases in the potassium concentration and osmolality. The gradual decline in volume output in the course of maximally stimulated secretion may also be, in part, a result of these homeostatic shifts.

1757 RESTORATION OF HOMEOSTASIS DURING HISTAMINE-STIMULATED GASTRIC SECRETION BY RAPID INTRAVENOUS INJECTION OF KCl.

(E.) Hirschowitz, B. I. (U. Alabama Med. Ctr., Birmingham) and G. Sachs. *Gastroenterology* 54(5):898-906, 1968.

In 9 of the 10 dogs with gastric fistulas used for previously reported studies on histamine-stimulated gastric secretion, the fluid lost during secretion was replaced by i.v. infusions of NaCl and/or KCl to determine the role of water and electrolyte depletion in the declining response to intravenous histamine (50 μg/kg/hr for 4.5 hr). The decline in volume of gastric secretion was only partly corrected by simultaneous infusion of normal saline, with or without the later addition of KCl (0.5 mEq/kg/hr), at a rate necessary to replace the volume of gastric juice lost (allowing a 5-min lag period). Although the decline was reduced from 30% to 15-18%, the initial output of gastric juice was lower, so that the total output of water, acid and electrolytes in 4.5 hr was not significantly changed by fluid replacement. Although there was some increase in pepsin and potassium secretion, the decline in gastric response to histamine is apparently not due to fluid or electrolyte depletion. In contrast, the secretion of acid was increased 30% by a rapid i.v. injection of KCl (1.0 mEq/kg in 10 min) beginning 3 hr after the histamine infusion, with only minimal fluid replacement. At the same time, there was an exchange of injected potassium for cellular sodium, while the injected chloride distributed itself in the anticipated extracellular fluid volume. The sodium concentration in the gastric juice fell and the potassium concentration rose. Since injection of KCl did not stimulate significant gastric secretion in these same dogs when they were not receiving histamine, although there was a sharp increase in plasma chloride, it is concluded that the reversible decline in secretion during histamine stimulation may be related to sodium entry into the cells due to the gain of bicarbonate by the body, creating an unfavorable Na/K ratio in the secreting cells.

1758 ESTROGENS AND GASTRIC SECRETION.

(E.) Kaufmann, H. J. (Yale U. Sch. Med., New Haven, Conn.) and H. M. Spiro. *Gastroenterology* 54(5):913-917, 1968.

Administration of conjugated equine estrogen (1.25 mg/day i.m. for 4 weeks) had no significant effect on gastric acid or pepsin secretion in 8 *Macacca mulatta* monkeys (7 females and 1 male). During estrogen treatment, the basal, histamine-stimulated, and insulin-stimulated acid output averaged 0.08, 0.46 and 0.28 mEq/hr, resp., compared to 0.17, 0.78 and 0.455 mEq/hr before treatment; these decreases are not statistically significant. In 8 human ulcer patients (3 gastric and 5 duodenal; 4 postmenopausal women and 4 sexually inactive males, 45-81 yr old), treatment with Premarin (1.25 mg twice a day by mouth for 3 months) also had no significant effect on gastric secretion, although 7 of the 8 showed slight decreases in acid output (basal secretion decreased from 2.7 ± 1.9 to 2.3 ± 1.8

mEq/hr and stimulated secretion decreased from 24.5 ± 13.8 to 23.3 ± 12.8 mEq/hr) which increased again after treatment was discontinued. The usual ulcer regimen and antacids were continued during this period, but no anticholinergics were given. All of the gastric ulcers healed completely radiologically; symptomatic improvement in the duodenal ulcer patients could be accounted for by other factors. These results do not explain the alleged beneficial effect of estrogens on peptic ulcer disease, nor the recognized sex differences in acid secretion and the incidence of ulcers.

1759 **CEPHALIC PHASE OF PANCREATIC SECRETION IN MAN.** *(E.)* Sarles, H. (Natl. Inst. Health Med. Res., St. Marguerite Hosp., Marseille, France), R. Dani, G. Prezelin, C. Souville and C. Figarella. *Gut* 9(2): 214-221, 1968.

The effect of psychic stimuli on pancreatic function was studied in a number of normal human subjects, patients convalescing from nongastrointestinal diseases, cholecystectomized patients with apparently normal pancreatic function, and patients with chronic calcifying pancreatitis by determining the output of bicarbonate, lipase, amylase, trypsin and chymotrypsin following three types of sham feeding: 1) exposure to the sight and odor of a grilled beefsteak; 2) exposure to the sight and odor of French rolls and coffee; 3) chewing of grilled beefsteak followed by removal from the mouth. Gastric juice was prevented from entering the duodenum during these experiments by means of a modified double-lumen tube with a rubber balloon between the gastric and duodenal segments. Specimens of gastric and duodenal juice were collected for control periods of 60 min before stimulation and at intervals for several hours. In every case, except in one anorectic patient and in a few patients tested with beefsteak early in the morning, psychic stimulation was followed by a significant increase in the volume, bicarbonate content and enzyme concentration of the duodenal pancreatic juice, with a lag time of 2-4 min and a maximal response after about 10 min; this was true even when two types of sham feeding were used at 60-min intervals. Gastric secretion, on the other hand, did not begin until 4-18 min later. Administration of atropine (1 mg i.v.) had no effect, but both pancreatic and gastric secretion were inhibited by Priamide (3 mg i.v.), a more powerful anticholinergic. Comparative studies in 32 subjects showed that psychic stimulation was more effective than i.v. administration of secretin (1 U/kg) plus pancreozymin (3 U/kg) in causing secretion of lipase, and probably of the other pancreatic enzymes, but less effective in causing secretion of water and bicarbonate.

1760 **EFFECT OF DIET ON FAECAL AND URINE UROBILINOGEN EXCRETION AND ITS POSSIBLE RELATIONSHIP TO THE PATHOGENESIS OF PEPTIC ULCERATION.** *(E.)* Malhotra, S. L. (Med. Dept., South East. Railway, Garden Reach, Calcutta, India). *Gut* 9(2):183-186, 1968.

A cross-over study on 27 adult male Indians convalescing from nongastrointestinal diseases showed that the fecal and urinary urobilinogen excretion was significantly higher on a nonmasticatory South Indian diet of rice and lentil soup than on a masticatory North Indian diet of wheat chappatties and green vegetables. Each diet was administered for 15 days and provided 2270 calories/day, although differing in the proportion of calories derived from fat and carbohydrate. The mean fecal urobilinogen concentration (mg%), weight of feces excreted (g/24 hr), fecal urobilinogen excretion (mg/24 hr), and urinary urobilinogen excretion (mg/24 hr) were 19.8, 285, 53.9 and 0.2238, resp., on the wheat diet and 71.6, 178, 99.6 and 1.2810, resp., on the rice diet. Subsequent studies have shown that these differences, which reflect differences in the amount of bile entering the duodenal lumen, are caused by the different eating habits (chewing or swallowing without chewing) and not by the composition of the diet *per se*. It is suggested that the higher incidence of peptic ulcer among South Indians may be due to the irritant effect of excess bile on the gastroduodenal mucosa.

1761 **CORRELATION BETWEEN GASTRIC JUICE ACIDITY AND PEPSIN ACTIVITY IN THE GASTRIC JUICE AND PEPSINOGEN ACTIVITY IN PLASMA AND URINE.** *(E.)* Bednarzewski, J. (Lublin Med. Acad., Poland). *Pol. Med. J.* 7(1):55-60, 1968.

One hundred patients were examined (47 men and 53 women, aged 15-47 yr) treated for various types of alimentary tract diseases to find whether: 1) gastric juice acidity is correlated with the activity of gastric pepsin, and with that of pepsinogen in plasma and urine, 2) there exists a correlation between pepsin activity in the gastric juice and of that pepsinogen in plasma and urine. A parallelism was found between the acidity of gastric juice and the activity of pepsin in this juice and that of pepsinogen in the plasma and urine. However, this parallelism is statistically significant in some cases only. No significant correlation was found between the activity of gastric pepsin and the activity of pepsinogen in plasma and urine, while a significant correlation was found between the activity of pepsinogen in plasma and in urine. Lack of parallelism between the activity of pepsinogen in plasma and urine and the activity of gastric pepsin is probably the results of many causes. Determination of plasma and urine pepsinogen activity cannot replace determination of the acidity of gastric juice, however, it is a valuable supplementary test which permits a closer evaluation of the secretory activity of the stomach.

1762 **THE EFFECT OF HYPERBARIC OXYGEN ON THE UPPER GASTROINTESTINAL SECRETIONS.** *(E.)* Caridis, D. T. (Dept. Surg., U. Aberdeen, Scotland), P. E. G. Mitchell, J. N. Norman and G. Smith. *Brit. J. Surg.* 55(2):103-105, 1968.

In adult male rats of the hooded Lister strain, exposure to hyperbaric oxygen at 1520 mm Hg for 9 hr had no significant effect on the volume or pH of the duodenal juice, nor on the blood sugar or pancreatic secretion of trypsin and amylase (slight increases noted). The secretion of hexosamines by the gastric mucosa following ligation of the pylorus was significantly increased by exposure to either 1100 mm Hg of O_2 for 20 hr (70.49 mg% hexosamine compared to 39.02 in controls), 1314 mm Hg of O_2 for 11 hr, or 1520 mm Hg of O_2 for 9 hr. On the other hand, pepsin secretion in pylorus-ligated rats was significantly decreased by exposure to hyperbaric O_2 at 1520 mm Hg for 8-9 hr, 1314 mm Hg for 10-11 hr, or 1100 mm Hg for 17-20 hr, there being an inverse relation between the O_2 pressure and the duration of exposure required to produce an effect. In view of the lack of an effect on pancreatic and duodenal secretion, it is concluded that hyperbaric oxygen interferes specifically with the secretory function of the parietal cells in the gastric mucosa rather than via an effect on gastric blood flow.

1763 **ROLE OF VAGAL INNERVATION ON PANCREATIC SECRETION.** *(E.)* Govaerts, J. P. (Brugmann Hosp., Brussels, Belgium) and R. Kiekens. *Surgery* 63(6):942-947, 1968.

To determine if exocrine pancreatic secretion after a meal is less disturbed after selective gastric vagotomy, pancreatic and gastric fistulas were created in 3 dogs, followed by a selective gastric vagotomy with pyloroplasty; total abdominal vagotomy with pyloroplasty followed fistulization in 4 dogs. After a 3-week recovery period, basal secretion levels were determined. The dogs were then fed a 200 g diet of warm, homogenized cooked meat, and pancreatic collections were made 0-30, 30-60, and 60-120 min later; secretory volumes, trypsin, chymotrypsin, lipase, and bicarbonate levels were measured. The pancreatic secretory volume and enzyme output were similar in controls and selectively vagotomized dogs during the first 30 min after eating. Volume and enzyme output, already lower than controls after abdominal vagotomy, remained low for the rest of the experimental period. Early pancreatic enzyme output is vagally controlled, whereas hormonal control is more important in later outputs.

1764 **SECRETORY CAPACITY OF STOMACH AND PANCREAS IN MAN.** *(E.)* Banks, P. A. (Mt. Sinai Hosp., New York City), W. P. Dyck, D. A. Dreiling and H. D. Janowitz. *Gastroenterology* 53(4):575-578, 1967.

The peak stomach acid secretion induced by maximal histamine injection (0.04 mg/kg) and the peak pancreatic secretion of bicarbonate induced by 1 unit of secretin per kg of body weight were compared in 15 normal subjects (8 men and 7 women; average age, 38) and 10 patients (8 men and 2 women; average age, 40) with active duodenal ulcers. The pancreatic secretory response was normal in all 25 subjects. Thirteen of 15 controls secreted sufficient bicarbonate to neutralize their acid output; the ratio of peak bicarbonate output to peak acid output varied from 60 to 430% (mean of 174%). In 4 of the 10 duodenal ulcer patients, the acid output was neutralized completely and in 5 of 10, acid neutralization ranged from 60 to 80%; the individual ratios varied from 30 to 209% (mean 102%). The species differences between man and dog, regarding acid neutralization capability, are discussed.

1765 **EFFECT OF DIET ON THE TRYPSIN AND CHYMOTRYPSIN OUTPUT IN THE STOOLS OF PATIENTS WITH AN ILEOSTOMY.** *(E.)* Roy, A. D. (Dept. Surg. Biochem., Western Infirmary, Glasgow, Scotland), R. Campbell and D. M. Goldberg. *Gastroenterology* 53(4):584-589, 1967.

The effect of diet on the daily output of trypsin and chymotrypsin from the ileostomies of 17 patients was studied. Raising protein intake from 40 to 90 g, (carbohydrate and fat being 200 and 40 g resp.) increased the weight of the ileostomy output by 10.8% while trypsin and chymotrypsin outputs increased by 69.5% and 26%, resp. Increase of carbohydrate and fat intake did not affect either the weight of the daily output or the output of enzymes. A significant increase in the output of both enzymes was noted between 6 P.M. and 6 A.M.; this nocturnal increase was not affected by a high protein diet.

1766 **THE SUBMAXILLARY SECRETORY RESPONSE IN THE DOG TO A SERIES OF DOSES OF PILOCARPINE.** *(E.)* Uotinen, K. G. (U. Dept. Pharmacol., Georgetown U., Washington, D. C.). *Proc. Soc. Exp. Biol. Med.* 126(1):92-97, 1967.

Repeated i.v. administration of pilocarpine in 32 dogs of both sexes, weighing 3.8 to 11.9 kg, increased salivary flow rate (as determined by sialogram) to a peak within 1-4 min and then declined. Duration of the secretory response was directly related to dose. The rate of flow was proportional to the dose, up to a secretory dose varying between 0.05 and 0.30 mg/kg (mean dose = 0.16 mg/kg); higher doses decreased the salivary flow rate. The decline of the salivary flow was related to the increased salivary viscosity induced by pilocarpine.

1767 **COMPARISON OF ACID AND PEPSIN OUTPUTS FROM GASTRIC FISTULA DOGS IN RESPONSE TO HISTAMINE, GASTRIN, AND RELATED PEPTIDES.** *(E.)* Cooke, A. R. (VA Ctr., Los Angeles, Calif.). *Gastroenterology* 53(4):579-583, 1967.

The maximal output of gastric acid, recorded in 4 dogs (17.3-21.3 kg body weight) with simple gastric fistulas, was approximately equal to the response to histamine, crude hog gastrin, hog gastrin II, synthetic human gastrin I, and tetrapeptide and pentapeptide. The gastrins and peptides tested were moderate stimulants of pepsin secretion and the maximal pepsin output induced was significantly higher than with histamine.

1768 **GASTRIC RESPONSE TO SUBCUTANEOUS INJECTION OF A GASTRIN-LIKE PENTAPEPTIDE.** *(E.)* Wormsley, K. G. (Royal Infirm., Manchester, England), M. P. Mahoney and G. Kay. *Gut* 8(5):475-481, 1967.

The gastric response to s.c. injection of a standard dose (6 μg/kg) of a gastrin-like pentapeptide (I.C.I. 50,123;Peptarlon) in 18 normal subjects, 22 patients with duodenal ulcer (awaiting surgery), 1 patient with pancreatitis, 1 with gastric ulcer and 4 with abdominal pain, was reproducible both when repeated immediately and after a period of time, ranging from hours to 14 days (7 subjects tested) and 4 months (1 subject). The median value of acid output was 16.8 mEq/30 min in normal subjects and 22.4 mEq/30 min in duodenal ulcer patients. Since the response varied proportionally with the volume of saline (0.15 M) used as a solvent, standardization of this factor is recommended. In 23 of 26 patients tested the response to s.c. pentapeptide was 63-106% of the maximal secretory response obtained by i.v. perfusion; the response of normal subjects did not differ from patients with duodenal ulcer. The gastric response to s.c. pentapeptide was more rapid, greater, and less sustained than the response to ametazole (1.5 mg/kg). Continuous i.v. infusion of secretin in 3 subjects, reduced the gastric response to s.c. pentapeptide. Vagotomy reduced the response by more than 50% in 11 of 12 patients tested. Mild side effects (malaise, muscle aches, abdominal discomfort, nausea) to s.c. pentapeptide developed between 4 and 6 min following injection in 20% of the cases studied and lasted less than 1 min. One patient had hypotension and bradycardia for about 10 min.

1769 PROTEINS AND SIALIC ACID IN THE GASTRIC JUICE OF HUMANS. *(E.)*

Mejbaum-Katzenellenbogen, W. (Dept. Biochem., U. Wroclaw, Poland), K. Kuczynska-Sekieta and J. Skrzypczyk. *Pol. Med. J.* 7(1):43-47, 1968.

In 20 healthy subjects, a definite correlation was found between the concentration of sialic acid and both the concentration of protein in gastric juice acidified with HCl or with sulfosalicylic acid. These correlations failed to appear in 33 patients with various digestive diseases (8 with duodenal ulcers, 7 with gastric ulcers, 6 with hyperacid and 6 with hypoacid gastritis, and 6 with biliary diseases). Determination of protein in gastric juice by means of the tannic acid micromethod revealed statistically significant differences in the concentration of total proteins and microproteins in patients with digestive diseases.

1770 POTENTIATION BETWEEN PENTAPEPTIDE (ICI 50,123) AND HISTAMINE IN THE STIMULATION OF GASTRIC SECRETION IN MAN. *(E.)*

Konturek, S. J. (1st Dept. Med., Krakow Sch. Med., Poland) and J. Oleksy. *Gastroenterology* 53(6):912-917, 1963.

A significantly higher level of stimulation of gastric secretion was achieved when a combined injection of gastrin-like pentapeptide (1.2 μg/kg/hr maximal doses) plus histamine (40 μg/kg/hr) was administered s.c. or i.v. to 18 healthy male subjects (20-35 years old, 52-73 kg body weight), in contrast to the level achieved by either agent alone (pentapeptide at doses ranging from 0.24 to 6 μg/kg and histamine at 40 μg/kg or 80 μg/kg). No side effects were noted except slight nausea, epigastric burning and somnolence. The results suggest that combined administration potentiates the stimulation of gastric secretion.

1771 CHANGES IN PANCREATIC ENZYMES AS A FUNCTION OF DIET IN THE CHICK. *(E.)*

Salman, A. J. (Dept. Animal Sci., Washington State U., Pullman). *Proc. Soc. Exp. Biol. Med.* 126(3):694-698, 1967.

Chicks fed unheated soybean meal showed growth depression, pancreas enlargement, and a high incidence of intestinal hemorrhage. The rate of amylase synthesis was lower, and the total pancreatic amylase activity was higher in these chicks than in chicks fed autoclaved soybean meal (the phenomenon may be a result of the enlarged pancreas). The specific activity of amylase and chymotrypsin decreased faster in the pancreas of chicks fed autoclaved soybean meal before and after 16 hours of fasting. Total amylase, trypsin and chymotrypsin activity followed the same pattern as the specific activity. Both the specific and total amylase activity decreased rapidly and no recovery was noted when, after 16 hours of fast, unheated meal was fed to chicks previously fed the autoclaved diet. This is in contrast to a slight decrease in activity, followed by recovery (due to synthesis of zymogen) when autoclaved soybean meal was fed to chicks previously adapted to the unheated diet. A similar pattern was noted for total and specific chymotrypsin activity. Both specific and total trypsin activity decreased and did not recover. The findings indicate that synthesis of the enzymes depends on diet. The rate of zymogen release was higher whenever unheated soybean meal was fed, regardless of the diet fed during the adaptation period.

1772 ROLE OF β-RECEPTORS IN SYMPATHETIC REGULATION OF ELECTROLYTES IN RAT SUBMAXILLARY SALIVA. *(E.)*

Yoshida, Y. (U. Alabama Med. Ctr., Birmingham), C. A. Schneyer and L. H. Schneyer. *Proc. Soc. Exp. Biol. Med.* 126(3):912-916, 1967.

The salivary flow rate was lower and the concentrations of K and HCO_3 were significantly higher in the submaxillary saliva of male adult Long Evans rats (300-400 g body weight) subjected to electrical stimulation of the sympathetic innervation than in animals where the parasympathetic nervous system was electrically stimulated; for Cl and Na, the differences were insignificant. Administration (i.p.) of the β-adrenergic blocking agent, Inderal, (5 mg/kg) 30 min. prior to sympathetic stimulation induced marked reduction of salivary K, HCO_3 and Cl, while Na and flow rate remained unchanged. Dibenzyline (5-10 mg/kg) reduced flow rate in all animals, doses of 10 mg/kg increased Na and Cl levels while HCO_3 was unaffected. Pilocarpine (8 mg/kg) increased salivary flow rate as well as K and Na levels. Inderal administered prior to sympathetic stimulation resulted in a significant decrease of salivary K in pilocarpine-evoked saliva but did not affect the electrolytes of saliva obtained following stimulation of the parasympathetic nervous system. The results suggest that β-adrenergic receptors are involved in the response of rat submaxillary gland to stimulation of the sympathetic system.

1773 GENETICALLY DETERMINED DIFFERENCES IN THE AMYLASE ACTIVITY OF MOUSE SUBMANDIBULAR GLANDS. *(E.)*

Hilton, F. (U. Louisville Sch. Med., Ky.). *Proc. Soc. Exp. Biol. Med.* 126(1):263-266, 1967.

The study of 10 inbred strains and 2 hybrids of mice of both sexes (approximately 550,000; 7-9 months old) revealed that normal levels of amylase activity in the submandibular glands vary according to strain. Data obtained for females do not follow the same rank order as in corresponding males; the lowest level for females was less than 25% of that noted in the strain with the highest value, while the lowest value in males was about 50%. Depending on the strain, gonadectomy increased, decreased, or did not change the activity of the enzyme in the salivary gland tissue. The results demonstrate that the activity of the enzyme investigated is related to the genotype and that its levels are also affected by endocrine factors.

1774 MEMORIAL LECTURE: AN EVALUATION OF GASTRIC ACID SECRETION TESTS. *(E.)*

Kay, A. W. (Western Infirmary, Glasgow, Scotland). *Gastroenterology* 53(6):834-844, 1967.

A review of the roles of gastric acid secretion tests in diagnosis and evaluation of therapy is presented. The augmented histamine test could be used in diagnosis, in planning surgical treatment, and as a surgical discipline. Medical vagotomy is considered to be insufficient for accurate prediction in the individual patient. A combination of criteria for interpretation of the insulin test may be a more accurate method of assessing the true incidence of patients at risk of recurrent ulceration. The synthetic gastrin-like pentapeptide, pentagastrin, may replace histamine as the stimulant of gastric acid secretion in a test for the measurement of maximal rate of acid secretion in man.

1775 DOSE-WEIGHT RELATIONSHIP OF HISTAMINE FOR MAXIMAL STIMULATION OF GASTRIC ACID SECRETION. *(E.)* Desai, H. G. (Tata Mem. Hosp., Parel, Bombey-12, India), A. V. Borkar and K. N. Jeejeebhoy. *Gastroenterology* 53(5):712-718, 1967.

The results of histamine tests using 0.04, 0.05, 0.06, and 0.07 mg per kg body weight suggest that s.c. and i.v. histamine tests should be performed by the administration of a fixed amount of histamine that maximally stimulates gastric acid secretion irrespective of body weight. In persons weighing less than 60 kg, 0.04 mg per kg body weight of histamine acid phosphate was inadequate to stimulate maximal gastric acid secretion since higher doses showed a significant rise in acid output. Maximal gastric acid secretion is probably related to the absolute amount of histamine administered rather than to a dose calculated according to body weight.

1776 EFFECTS OF CONTINUOUS INSULIN INFUSIONS ON UNSTIMULATED HUMAN GASTRIC SECRETION. I. INTERRELATIONS BETWEEN INSULIN DOSAGE, BLOOD SUGAR, AND GASTRIC SECRETORY CHANGES. *(E.)* Demand, H. A. (Erlangen, Germany), H. U. Gross and G. Berg. *Gastroenterology* 54(6):1038-1043, 1968.

The effects of a slow blood sugar reduction by means of slow continuous insulin infusion were investigated in 21 subjects, 3 of whom were diabetic. Insulin, diluted with physiological saline to a concentration of 1 U/ml, was administered by infusion pump at an average rate of 0.08946 U/kg/hr; fluid volumes varied between 6 and 12.5 ml/hr. Gastric juice, aspirated through nasogastric tube, and capillary blood samples were analyzed for acidity, Cl^-, K^+, Na^+, Ca^{++}, inorganic phosphate, glucose, and pepsin. Increasing the insulin dosage accelerates the rate of fall of blood sugar, which has no influence on secretory inhibition, time of onset or rate of secretory increment. The lower the absolute blood sugar at secretory minimum, the more pronounced the hypoglycemia at the onset of secretory stimulation. The duration of secretory inhibition does not influence the absolute blood sugar at onset or maximum secretory stimulation, but these values are lower, the longer the inhibition. Secretory stimulation sets in at individually different levels of hypoglycemia. After hypoglycemia correction with intravenous glucose, secretory stimulation was not immediately abolished but decreased stepwise. Secretory changes after insulin are regulated by an interplay of multiple factors, as suggested by the large number of correlations found with relatively low significance.

1777 EFFECTS OF CONTINUOUS INSULIN INFUSIONS ON UNSTIMULATED HUMAN GASTRIC SECRETION. II. QUANTITATIVE CHANGES OF THE GASTRIC JUICE PATTERN. *(E.)* Demand, H. A. (Erlangen, Germany), H. U. Gross and G. Berg. *Gastroenterology* 54(6): 1043-1049, 1968.

The effects of continuous insulin infusion (0.075 U/kg/hr) on gastric secretory volume, H^+, Na^+, K^+, Cl^-, Ca^{++}, inorganic phosphate and pepsin concentrations in gastric juice were investigated in 21 patients during different secretory phases of insulin hypoglycemia. There was a negative correlation between H^+ and Na^+ concentrations with the minimum of the one occurring with the maximum of the other. H^+ and K^+ concentrations first rose and then fell off together at secretory inhibition, only to rise again at the onset of primary stimulation. The increment in K^+ concentration started earlier than the acid peak response and was of shorter duration. Pepsin concentrations, although appearing to parallel acidity changes, increased earlier, having its maximum 20 min before peak acidity. The volume rate ranged between pepsin and acidity in its increment. Ca^{++} and inorganic phosphate closely followed Na^+ concentrations in strong reciprocity to acidity. H^+, K^+, pepsin and volume interrelationships were positively significant, although maximum H^+ output appeared 10 min after the common maximum for volume, pepsin, K^+ and Cl^- outputs. The Na^+, Ca^{++}, and inorganic phosphate peaks coincide with the maximum secretory volume and precedes the maximum acid response. Secretory stimulation was effectively reduced with sufficient intravenous glucose even at maximum acid responsiveness. Although hypoglycemia correction led to an immediate decrease, prestimulation levels were approached only gradually.

1778 MECHANISMS OF ACTION OF RESERPINE ON GASTRIC SECRETION OF ACID. *(E.)* Emas, S. (U. Clin. Surg., Allamanna Sjukhuset, Malmo, Sweden). *Amer. J. Dig. Dis.* 13(6):572-578, 1968.

Reserpine's action on stomach acid secretion can be divided into (1) that observed with daily repeated administration and (2) that noted after a single dose. Observations from studies on anesthetized dogs suggest that repeated reserpine administration alters the response to a single dose of reserpine not only by a vagal depletion of gastrin but also by depletion of another factor involved in reserpine's action not related to the vagus nerves. In the conscious cat, gastrin content, reduced transiently by repeated administration, returns to normal after 8 days; this suggests that reserpine did not block gastrin synthesis. In another study, after 4 days of repeated reserpine administration, gastrin content initially decreased and then returned to normal within 48 hr of the last injection in nonvagotomized cats, but remained suppressed in vagotomized cats. This suggested that the vagus nerves were not only involved in the reduction but also in the restoration of gastrin content after repeated reserpine administration. Large single doses of reserpine stimulate gastric acid secretion by vagally released gastrin and an action independent of the vagus nerves and gastrin. Small single doses stimulate stomach acid secretion in the conscious cat without decreasing gastrin content; small doses stimulate secretion in the vagotomized anesthetized cat, the conscious antrectomized dog, dogs with vagally denervated stomachs, and humans after antrectomy and vagotomy. The role of reserpine in stimulating gastric secretion is vagally dependent and might involve vagal release of gastrin in the cat and histamine in the rat. It also can act after vagotomy and resection of areas claimed to contain gastrin, but the nature of the action is not yet established.

1779 PANCREATIC SECRETION STIMULATED BY THE ACTION OF ALCOHOL ON THE GASTRIC

ANTRUM. *(E.)* Schapiro, H. (U. Tennessee Med. Units, Memphis), L. D. Wruble, J. W. Estes and L. G. Britt. *Amer. J. Dig. Dis.* 13(6):536-539, 1968.

The ability of alcohol to stimulate pancreatic secretion via the gastrin mechanism was studied in 17 experiments involving 6 gastrojejunostomized dogs (17-25 kg) with surgically created pancreatic fistulas and isolated innervated pyloric pouches; in addition, denervated Heidenhain pouches were constructed in 4 dogs and gastric fistulas established in 2 dogs. Pancreatic and gastric juice samples were collected at 10-minute intervals between 60-90 minutes after saline and 10% alcohol irrigations. In 4 studies on 4 dogs, saline antral perfusion did not alter pancreatic volume or gastric secretory responses. In Heidenhain pouch dogs, pancreatic volume and amylase output increased 30% and 44%, resp,,after a latent period of 10-30 minutes; an augmented gastric response followed by 10-20 minutes. Alcohol perfusion of antral pouches in 4 studies increased pancreatic volume and pancreatic amylase after a 10-20 minute latent period, followed by a gastric secretory response 20-30 minutes later. Alcohol increases pancreatic volume and enzyme output after 10-20 minutes and produces a gastric secretory response in 30-40 minutes.

1780 BLOOD BASE CHANGES AFTER SECRETION OF BICARBONATE BY PANCREAS. *(E.)* Anderton, J. L. (Roy. Infirm., Edinburgh, Scotland), N. D. C. Finlayson, I. M. Murray-Lyon, A. F. Smith and D. J. C. Shearman. *Brit. Med. J.* 2(5600):279-281, 1968.

1781 PEPSINOGENS AND PEPSINS. *(Rev.)(E.)* Turner, M. D. *Gut* 9(2):134-138, 1968.

1782 A GASTRIC SECRETION ANTAGONIST'S EFFECT. *(E.)* Connell, A. M. (Dept. Surg., Queen's U., Belfast, North. Ireland), W. Sircus, R. A. Hill, I. B. Macleod and C. G. Thomson. *Lancet* 2(7518):720, 1967.

1783 INTESTINAL HORMONES AND PLASMA INSULIN: SOME OBSERVATIONS ON GLUCAGON, SECRETIN, AND GASTRIN. *(E.)* Jarrett, R. J. (Guy's Hosp., London, England) and N. M. Cohen. *Lancet* 2(7521):861-863, 1967.

1784 NOMENCLATURE OF THE PEPSINS. *(E.)* Etherington, D. J. (United Liverpool Hosp., England) and W. H. Taylor. *Nature* 216(5112):279-280, 1967.

1785 HYDROCHLORIC RESPONSE TO THE MAXIMAL HISTAMINE METHOD IN RATS WITH CHRONIC FISTULA. *(Fr.)* Ruiz-Ochoa, V. (Jiminez Diaz Foundation, Madrid, Spain) and H. G. Modena. *Gaz. Med.* 74(28):5261-5266, 1967.

1786 EFFECT OF DUCT PRESSURE ON THE RATE OF SALIVARY SECRETION AND BLOOD FLOW IN THE DOG. *(E.)* Lubarsky, A. (Indiana Univ. Med. Ctr., Indianapolis) and P. A. Nicoll. *J. Appl. Physiol.* 24(5):653-657, 1968.

1787 GASTRIC SURFACE EPITHELIAL FUNCTION - A BIOCHEMICAL BARRIER. *(Rev.)(E.)* Werther, J. L. (Mt. Sinai Hosp., New York City). *Israel J. Med. Sci.* 4(1):55-59, 1968.

1788 GASTRIC SECRETION IN MAN AFTER PENTAGASTRIN STIMULATION. *(E.)* Dal Monte, P. R. (Inst. Path. Spec. Med., U. Bologna, Italy). *G. Clin. Med.* 48(12):1378-1387, 1967.

1789 CHANGES IN THE CONTENT OF GASTRIN IN THE PYLORIC ANTRUM OF SENSITIZED DOGS. *(Fr.)* Groza, P. (D. Danielopolu Inst. Norm. Path. Physiol., Bucharest, Rumania), M. Corneanu, V. Buzoianu and S. Ionescu. *Rev. Roum. Physiol.* 5(1):37-40, 1968.

1790 STOMACH SECRETION ANALYSIS WITH PENTAGASTRIN. *(Ger.)* Classen, M. (Med. Clin. & Polyclin., Erlangen-Nürnberg U., Germany). *Deutsch. Med. Wschr.* 93(14):704-705, 1968.

1791 PENTAGASTRIN AS A STIMULANT OF MAXIMAL GASTRIC SECRETION IN MAN. *(Sp.)* Laudano, O. M. (Centenario Hosp., Rosario, Argentina). *Rev. Esp. Enferm. Apar. Dig.* 27(4):544-549, 1968.

1792 EFFECT OF COMMON BILE-DUCT TRANSPLANTATION ON GASTRIC ACID SECRETION IN THE DOG. *(E.)* Breen, J. J. (U. Minnesota Med. Sch., Minneapolis), E. Molina and W. P. Ritchie. *Brit. J. Surg.* 55(4):282-284, 1968.

DIGESTION

1793 DEGRADATION OF FIVE PANCREATIC HYDROLASES DURING THE INCUBATION OF SMALL INTESTINE CONTENTS OF RAT. *(Fr.)* Khayat, M. H. (Fac. Med., U. Brussels, Belgium), A. Vandermeers, J. Rathe and J. Christophe. *Arch. Int. Physiol.* 76(1):184-185, 1968.

Five samples of intestinal contents from 200-g rats on a normal unrestricted diet were suspended in water, centrifuged, and the supernate incubated aerobically at 37C in an agitator for 0, 1, 2, 3, 4, 5, 6, and 24-hr periods. Buffer was not added and microbial growth developed which accelerated the degradation of the hydrolases. Tetracycline (1 mg/ml), streptomycin (0.5 mg/ml) or penicillin (100 U/ml) were added to the media to retard growth. The kinetics of the degradation of proteins and peptides precipitated from the intestinal fluid by trichloracetic acid correspond to the sum of an exponential regression series. The decrease in activity of the hydrolases is a simple first-order decrease and is defined by a degradation constant K_D expressed in hours^{-1} at 37C. The half-life in hours of the following enzymes was recorded, with n representing the number of trials: 2 trypsins, 12.76 ± 0.85 (n = 9); chymotrypsin, 0.99 ± 0.24 (n = 8); amylase, 8.14 ± 0.91 (n = 11); lipase, 1.07 ± 0.35 (n = 5). The effects on K_D of variations in conditions, such as pH, addition of enzyme inhibitors, and temperature are discussed.

1794 GASTRIC PROTEASES AND PROTEASE INHIBITORS. *(E.)* Turner, M. D. (U. Rochester Sch. Med. & Dentistry, N. Y.), L. L. Miller and H. L. Segal. *Gastroenterology* 53(6):967-983, 1967.

A review of the secretion, activity, inhibition, and measurement of human and animal proteases, active at acid pH, is presented. There is a great similarity in the action of rennin and pepsin which is very different from that of other proteases. Pepsin secretion can be stimulated by cholinergic stimuli, including vagal stimulation, hypoglycemia, or conditioned reflexes, and can be blocked by atropine. The results of gastric mucus studies have indicated that polysaccharides act as pepsin inhibitors. The most potent antagonists of pepsin are alkalis which inhibit most of the pepsin within seconds in an irreversible manner.

1795 BILE ACID TRANSFORMATIONS BY MICROBIAL STRAINS BELONGING TO GENERA FOUND IN INTESTINAL CONTENTS. *(E.)* Midtvedt, T. (Frues Bacteriol. Inst., Oslo, Norway) and A. Norman. *Acta Path. Microbiol. Scand.* 71(4):629-638, 1967.

1796 THE RELATIONSHIP OF THE SPHINCTER OF ODDI TO THE STOMACH, DUODENUM AND GALL-BLADDER. *(E.)* Wyatt, A. P. (Woolwich Mem. Hosp., London, England). *J. Physiol.* 193(2):225-243, 1967.

The effects of various mechanical and electrical stimuli applied to the gallbladder, bile ducts, stomach, duodenum, jejunum, liver, eyeballs, Achilles tendon and foot pads on flow through the sphincter of Oddi was studied, along with pressure changes from balloons in the gastric antrum and duodenum, in 25 adult mongrel dogs using two experimental systems: 1) a constant-pressure perfusion in which a Marriott bottle was used as a reservoir and flow was measured by a photoelectric drop counter; 2) a constant-rate infusion in which a Harvard constant-infusion pump was used and pressure variations produced proximal to the sphincter by alterations in sphincteric tone were recorded. Pressures within the gallbladder and upper bile ducts were also recorded, and some of the dogs were subjected to prior vagotomy, celiac ganglionectomy, vagotomy plus ganglionectomy, division of both phrenic nerves, laminectomy, or bilateral excision of the thoracic sympathetic chain from T6 to T12 plus a length of the greater splanchnic nerve. The normal opening pressure of the sphincter varied from 4 to 30 cm H_2O and perfusion pressures of 2-17 cm H_2O were needed to produce satisfactory rates of flow. Increased duodenal activity was consistently associated with cessation of biliary flow, while increased gastric activity had variable effects which were usually mediated via the duodenum. There was no consistent effect of gallbladder pressure on flow, but mechanical or electrical stimulation of the gallbladder produced increases in flow. This reflex was mediated via fibers travelling close to the upper part of the common bile duct and into the celiac ganglion. Stimulation of other viscera produced highly variable results. It is concluded that the sphincter of Oddi is partially autonomous but is readily affected by changes in duodenal tone. A definite relationship exists between gastric antral activity and flow through the sphincter of Oddi, particularly when food is present in the stomach.

1797 ACTION OF METOCLOPRAMIDE ON GASTRIC EMPTYING AND SMALL BOWEL TRANSIT TIME. *(E.)* James, W. B. (South. Gen. Hosp., Glasgow, Scotland) and R. Hume. *Gut* 9(2):203-205, 1968.

A double-blind study on 50 patients (25 men and 25 women, 19-72 yr old) referred for barium meal examination (including 21 with duodenal ulcer, 6 with gastric ulcer, one with a hiatus hernia, one with duodenal cancer, and 21 who were radiologically normal) showed that metoclopramide (20 mg i.v.) significantly promotes gastric emptying and accelerates the transit of barium through the small intestine. Whereas 15 of 25 patients given metoclopramide showed empty stomachs at 90 min and 16 showed barium in the cecum after 60 min, this was true of only 7 and 2, resp., of the patients given placebo. This effect is apparently due to increased contractile activity in the stomach accompanied by dilatation of the pylorus and duodenum, and may prove advantageous in diagnostic radiology. In another double-blind study on 60 patients receiving Biligrafin Forte for intravenous cholangiography, neither metoclopramide (20 mg i.m.) nor chlorpromazine (50 mg i.m.) was effective in preventing vomiting. Among a total of 142 patients given metoclopramide (20 mg i.v.), one complained of drowsiness and 2 vomited, but in 6 other cases nausea or vomiting was improved.

1798 PROBLEMS OF METHODOLOGY AND INTERPRETATION, AND ANALYSIS OF RECORDS. *(E.)* Connell, A. M. (Dept. Surg., Queen's U., Belfast, North. Ireland). *Amer. J. Dig. Dis.* 13(5):397-405, 1968.

Intraluminal pressures at the same site in the sigmoid colon were recorded simultaneously by means of miniature balloons (7 x 10 mm), open-ended tubes, and pressure-sensitive radiotelemetering capsules in human volunteers. Comparison of the curves obtained showed that the open-tube record was frequently distorted due to blockage. In addition to the marked distortion which is immediately obvious and can usually be corrected by flushing through the tube, partial blockage can result in lesser errors which are difficult to detect except by frequent internal calibration. The miniature-balloon record was found to be closer to that of the radiotelemetering capsule than the open-tube record. However, both miniature balloons and open-ended tubes showed totally different patterns of activity in some cases when they were placed as close as 15 mm apart, indicating that the segment length in the sigmoid colon may sometimes be less than 15 mm. This, together with the problem of partial blockage by mucosa or bowel contents, creates doubt as to the significance of analyses of motility at particular sites in the intestine. The results of a study of motor activity in 7 control subjects and 14 patients with diverticular disease, using open tubes placed in the sigmoid at 10, 17.5 and 25 cm from the anus (Parks, Thesis, Queen's University, Belfast), indicate that although there was no marked difference between the groups under basal conditions, the postprandial increase in activity was much greater in the patients (260% compared to 152% in controls). In 25 patients and 25 controls studied by means of miniature balloons, on the other hand, both the basal activity and the increase after eating (174%) were the same in both groups. The explanation lies in the fact that an open tube records true intraluminal pressure while a miniature balloon not only reflects changes in intraluminal pressure but also movements of the wall. In a viscus with a wide lumen, an open tube will detect less of the wall activity than in a viscus with a narrow lumen. A miniature-balloon record, on the other hand, is less likely to be affected by changes in diameter, because even in the relaxed state it will detect some wall activity not adequate to change the intraluminal pressure. In diverticular disease, where the intestinal segment is narrow, it is likely than an activity which results in further narrowing of the lumen, such as eating, will result in an exaggerated detection of motor activity due to the much greater likelihood of the formation of pressure pockets. In the conclusion of the article, the use of an on-line analog/digital computer system for the instantaneous analysis of motility data is described and recommended.

1799 THE RESPONSE OF THE INTERNAL ANAL SPHINCTER IN MAN TO STIMULATION OF THE PRESACRAL NERVE. *(E.)* Shepherd, J. J. (Mulago Hosp., Kampala, Uganda) and P. G. Wright. *Amer. J. Dig. Dis.* 13(5):421-427, 1968.

Either the peripheral end of the cut presacral nerve or the intact nerve below a local anesthetic block of procaine was stimulated electrically in 11 patients undergoing surgery for congenital or acquired megacolon and in 3 controls (following analgesic presacral neurectomy). All patients were under N_2O/O_2 anesthesia plus muscle relaxants and had balloons inserted in the rectum to record pressure changes. In all cases, stimulation (20-30 volts at 5-50 cycles/sec for 1 millisecond) produced relaxation of the internal anal sphincter, followed by a rapid recovery of basal tone and in some cases by transitory rebound contraction. This response was not affected by atropine in the doses used (1 mg i.v.). This finding contradicts the widely quoted observation of Rankin and Learmonth (*Ann. Surg.* 92:710, 1930) that faradic stimulation of the presacral nerve produces contraction of the anal sphincter. The lack of any difference between patients and controls casts doubt on the possibility of any beneficial effect of presacral neurectomy in congenital or acquired megacolon.

1800 **PRESSURE AND TRANSIT IN THE SMALL INTESTINE: THE CONCEPT OF PROPULSION AND PERIPHERAL RESISTANCE IN THE ALIMENTARY CANAL.** *(E.)* Texter, E. C., Jr. (Northwest. U. Med. Sch., Chicago, Ill.). *Amer. J. Dig. Dis.* 13(5):443-454, 1968.

Some of the new techniques for studying gastrointestinal motor activity and some of the apparently paradoxical relations between intraluminal pressure-wave activity, propulsion, and the rate of transit through the digestive tract are reviewed on the basis of the literature (17 refs.) and the author's experience. Particular attention is given to the measurement of transit time, intraluminal pressure gradients, and *in vivo* neuromuscular activity, and some of the results obtained by means of implanted, extraluminal force transducers in dogs are discussed (see Reinke et al., *Amer. J. Dig. Dis.* 12:113, 1967). The limitations, as well as the contributions, of balloon-kymograph and X-ray studies are pointed out. It is noted that intraluminal pressures obtained by means of open-ended tubes give no indication of changes in contour of the alimentary canal or changes in position of the luminal contents, deficiencies which can be overcome to some extent by simultaneous time-lapse cinefluorography. In the intestine, however, in contrast to the stomach and esophagus, there is an inverse relation between intraluminal pressure-wave activity and transit through the bowel, aboral movement being slowed by the segmentation waves produced by circular muscle contractions (which appear on the pressure record), even though it is enhanced by longitudinal muscle activity. The contractile activity of the stomach and small intestine, most of which is the result of circular muscle activity, can be classified as basal, burst and intermediate, with varying responses to stimuli and drugs. The similarities between flow through the alimentary canal and that through the vascular system are pointed out, and the concepts of peripheral resistance, pressure receptors, osmoreceptors and pacemakers are defined as they pertain to the gastrointestinal tract. The motor activity of each organ in the gastrointestinal tract is then viewed in relation to the specific function of that organ, the major roles of the esophagus, stomach, small intestine and colon being transport, digestion, absorption and storage, resp. In addition, the interrelations between parts of the digestive tract are clarified. An understanding of the nature of gastrointestinal motility is complicated by species and individual differences and by deficiencies in contemporary recording techniques. As a result, for example, the correlation between Type I waves and mixing activity, or Type III waves and propulsion, in the small intestine is now in doubt. Rather, aboral transport of a meal now seems to be more closely related to the pressure gradient between proximal and distal segments of the small intestine. With the probable exception of waves that progress over a considerable distance and of rhythmic sequences, pressure waves contribute more to increasing the peripheral resistance than to promoting propulsion. Since there is a progressive decrease in the level of activity in progressively distal areas of the small intestine, this gradient probably constitutes the most important mechanism of aboral transport.

1801 **THE CORRELATION OF THE PRESSURES IN THE HUMAN COLON WITH THE SHAPE OF THE COLONIC LUMEN AS SHOWN BY CINERADIOGRAPHY COMBINED WITH SIMULTANEOUS PRESSURE RECORDING.** *(E.)* Painter, N. S. (Manor House Hosp., Golders Green, London, England). *Amer. J. Dig. Dis.* 13(5): 468-479, 1968.

Pressures recorded from the sigmoid colon of 99 patients by means of open-ended water-filled tubes were correlated (in 49 cases) with simultaneous cineradiograms in order to study the interacting effects of diverticulosis and drugs and to elucidate the mechanism by which the sigmoid can localize intraluminal pressure. The results showed that diverticulosis is not caused by basal intraluminal hypertension, since pressure tracings from normal and diseased colon were basically identical. Morphine increased the intraluminal pressure in both normal and diverticula-bearing segments, but particularly high pressure waves (over 90 mm Hg) could be seen in the immediate vicinity of the diverticula, in all stages of the disease, suggesting that morphine is not a suitable analgesic in these cases. Neostigmine also increased the intraluminal pressure, although the pressure patterns differed from those after morphine. Pethidine, in contrast, decreased the number of pressure waves and caused the diverticula to drain into the colonic lumen. The high pressures evoked by morphine or neostigmine could be abolished by intravenous propantheline bromide. Waves of high pressure were found to be associated with segmentation of the colon, accompanied by distension and extrusion of diverticula in the intervening segments. This process of segmentation, resulting in the compartmentalization of the intestine into a series of small chambers with obstructed outflow in which very high pressures can be generated, appears to be the mechanism responsible for the pulsion force that causes diverticulosis. On the basis of personal experience and theoretical considerations, it is recommended that pressure recording should always be accompanied by cineradiography so that the pressure tracings obtained can be correlated with the configuration of the colonic wall. The use of balloons, furthermore, is rejected as being totally unsuitable for the measurement of either intraluminal pressure or intestinal motility.

1802 **THE RELATIONSHIPS BETWEEN ANATOMY AND MOTOR ACTIVITY OF THE COLON.** *(E.)* Torsoli, A. (2nd Med. Clin., U. Rome, Italy), M. L. Ramorino and V. Crucioli. *Amer. J. Dig. Dis.* 13(5):462-467, 1968.

Anatomical studies of normal colonic segments taken from 31 patients (10 days to 68 yr of age) of both sexes showed that the longitudinal layer of the musculature is not limited to the taeniae but continues along the entire circumference, making possible peristaltic activity. In longitudinal sections, the muscular and nervous elements of the Auerbach plexi show a peculiar arrangement at the level of the crescent-like folds, with an increase in thickness of both muscle layers, and increased number of ganglia, and narrowing of the interfascicular spaces in the circular layer. The crescent-like folds thus seem to be morphologically differentiated structures which may be deepened or transformed into circumferential contractions by the functional folds which correspond to the contraction of the musculature *in vivo*. Motility-pressure studies in 15 normal subjects showed that the basal motility is greater in the sigmoid than in the ascending colon (motility index of 17.20 and 3.98, resp.), due mostly to an increased frequency of pressure waves. This can be correlated with the strong development of both muscle layers in the sigmoid colon (which are twice as thick as in the proximal colon) and with the decreased caliber of the lumen (5.9, 9.1 and 10.6 cm, resp., in the sigmoid, transverse, and ascending colons of 10 normal subjects, 29-68 yr old). This may also explain the increased frequency of diverticular disease and segmental muscular stricture in the sigmoid. After a standard meal, however, the difference between the motor activity of the sigmoid and ascending colon tends to diminish or even change sign. This is also true in diarrhea, where large negative differences may be seen after eating. In constipation, on the other hand, the difference seems to become more positive after eating.

1803 EFFECT OF BILE SALTS ON GASTRIC EMPTYING AND INTESTINAL TRANSIT IN THE RAT. *(E.)* Feldman, S. (Sch. Pharm., State U. New York, Buffalo) and M. Gibaldi. *Gastroenterology* 54(5):918-921, 1968.

Oral administration of sodium deoxycholate (0.005-0.026 M) and taurodeoxycholate (0.026-0.10 M) to fasted, male, Sprague-Dawley rats resulted in delayed gastric emptying and retarded transit through the proximal third of the small intestine as measured by the movement of a 0.07% phenol red solution administered at the same time. The highest doses of deoxycholate and taurodeoxycholate decreased gastric emptying to 17.3 and 49.2%, resp., compared to 76% in controls (all animals sacrificed 30 min after administration of phenol red). There was a definite relation between the concentration of each bile salt and the inhibition of gastric emptying, but the unconjugated form was 5-10 times as effective as the conjugated salt. Transit of phenol red through the 2nd intestinal segment was more variable, and was significantly accelerated by the highest doses of bile salts (to 58.8-62.3% compared to 16.6% in controls). All doses of bile salt also resulted in significant accumulation of fluid within the gastrointestinal tract, the dilution of the intestinal contents being proportional to the concentration of bile salt administered. It is suggested that this increase in volume of the intestinal contents may play a role in the inhibition of gastric emptying and transit through the proximal small intestine.

1804 THE ACTION OF NICOTINE AND CATECHOLAMINES ON THE HUMAN INTERNAL ANAL SPHINCTER. *(E.)* Friedmann, C. A. (St. Mark's Hosp., London, England). *Amer. J. Dig. Dis.* 13(5):428-431, 1968.

The *in vitro* effects of nicotine, epinephrine, norepinephrine, acetylcholine, isoprenaline, dimethylphenylpiperazinium iodide (DMPP) and tetramethylammonium bromide (TMA) in the presence of various blocking agents were studied on 300 strips of internal anal sphincter taken at operation. While nicotine had no effect on the distal part of the sphincter, it produced relaxation in 55 out of 105 proximal strips and contraction in 13 of 105 strips (no effect in 37). Norepinephrine and TMA, in contrast, produced contraction in almost all proximal strips tested, while isoprenaline almost always produced relaxation and DMPP had a mixed effect (56% contraction, 26% relaxation and 18% no effect). The distal part of the anal sphincter responded similarly to isoprenaline and norepinephrine. Epinephrine also produced both contraction and relaxation in both the proximal and distal portions of the sphincter, and similar inconsistency was noted in the responses to acetylcholine, potassium sulfate and electric shock. The contractions due to norepinephrine could be abolished or even converted to relaxations in many cases by α-adrenergic blocking agents or cocaine, indicating that norepinephrine has three major sites of action: postganglionic adrenergic receptor sites, α-adrenergic receptor sites, and β-adrenergic receptor sites. The effects of nicotine could be blocked by either ganglionic, postganglionic adrenergic, or β-adrenergic blocking agents, as well as by procaine or reserpine, indicating that nicotine probably acts on adrenergic nerve fibers with subsequent release of a catecholamine (probably norepinephrine rather than an isoprenaline-like subjstance) close to β-adrenergic receptor sites. In contrast, DMPP and TMA (which are smaller molecules) seem to act on adrenergic fibers which release norepinephrine close to α-adrenergic receptor sites.

1805 TIME-LAPSE CINEFLUOROGRAPHY IN MAN. *(E.)* Ritchie, J. (Nuffield Inst. Med. Res., Oxford, England). *Amer. J. Dig. Dis.* 13(5):488-493, 1968.

In the normal colon, time-lapse cinefluorography 12 hr after swallowing 100 ml of Micropaque barium sulfate shows two types of propulsive movement: 1) movement based on a "systolic" action of the bowel wall, by which the contents of 3 or more haustra, contracting simultaneously as a coordinated unit, are displaced aborally into an adjoining section; 2) "peristaltic" movement arising as a progressive contraction wave which advances along the colon, usually preceded by muscular relaxation. The first type is seen mainly in the first half of the colon and is best adapted to the transportation of liquid contents. Peristalsis is most common in the transverse and distal colon, and is much more effective in the transportation of solids. One or the other of these movements occurs about once every 6 hr; each movement takes about 10-20 min to complete, and results in the aboral transport of bowel contents at a rate of about one inch per minute. It is suggested that some of the basic defects in diverticular disease and the irritable colon syndrome may be related to local differences in the mechanism of propulsion. In this connection, the diagnostic value of qualitative studies of bowel activity is emphasized, and two illustrative cinefluorographic series are presented demonstrating the effect of diverticulosis and spastic colon, resp., on propulsion in the large intestine.

1806 PARADOXIC ESOPHAGEAL CONTRACTIONS WITH VAGUS STIMULATION. *(E.)* Geisel, A. (Michael Reese Hosp., Chicago, Ill.), P. Lott, Jr. and H. Necheles. *Amer. J. Gastroent.* 49(5):409-414, 1968.

In male and female mongrel dogs anesthetized with pentobarbital, stimulation of the vagus nerves in the neck (Grass stimulator, frequency 15-60 cycles/sec, duration 2 msec, delay 2 msec, monophasic, at the voltage producing half-maximal contraction) resulted in variable changes in intraesophageal pressure (water-filled tubes) and blood pressure, depending on the placement of the electrodes on the proximal and distal parts of the cut vagi and on the polarity of the stimulus. There was no apparent relation between the blood pressure changes and the response of the esophageal musculature. The results were repeatable in the same dog, but were not at all uniform in different dogs. These variations may help to explain some of the varying and contradictory results reported in the literature on the effects of vagus stimulation in the dog.

1807 EFFECT ON FUNDIC POUCH MOTOR ACTIVITY OF STIMULATORY AND INHIBITORY FRACTIONS SEPARATED FROM PANCREOZYMIN. *(E.)* Brown, J. C. (Dept. Physiology, U. British Columbia, Vancouver, Canada) and C. O. Parkes. *Gastroenterology* 53(5):731-736, 1967.

The effects of pancreozymin fractions on motor activity was studied in fundic pouches from 10 dogs. The crude duodenal extract pancreozymin was separated into 5 fractions chromatographically. Fraction 2 was the most potent stimulator of motor activity and fractions 4 and 5 were the most potent inhibitors of motor activity. It is concluded that the free serotonin content of the extracts is not responsible for fundic pouch stimulation. The existence of a duodenal, pH-dependent, humoral mechanism for the control of gastric motor activity is suggested.

1808 GASTROINTESTINAL MOTILITY IN MAN: A STUDY OF PROPENZOLATE. *(E.)* Danhof, I. E. (Dallas, Texas). *Amer. J. Gastroent.* 48(3):185-197, 1967.

The data presented indicate that propenzolate is effective for 12 or more hours in decreasing motility and delaying propulsive activity along the gastrointestinal tract in both normal subjects and in patients with hypermotility states. Oxygen transit time is a measure of the total transport mechanisms through the major portion of the gastrointestinal tract, providing physiological information regarding propulsive motility. Diminished propulsive motility was noted in the smooth muscle of both the small and large intestine after the administration of propenzolate by the barium motor meal, rectosigmoid pressure recordings, and oxygen transit time evaluation.

1809 ANALYSIS OF THE MOTOR EFFECTS OF GASTRIN AND PENTAGASTRIN ON THE HUMAN ALIMENTARY TRACT *IN VITRO.* *(E.)* Bennett, A. (King's Coll. Hosp. Med. Sch., London, England), J. J. Misiewicz and S. L. Waller. *Gut* 8(5):470-474, 1967.

The mechanism of action of gastrin and pentagastrin was studied in 173 isolated strips of gastrointestinal muscle from 111 patients. The most striking result of this study is that while gastrin and pentagastrin contracted gastric muscle, their effect on the colon was weak and the small intestine was virtually unaffected. The effects of both substances were qualitatively similar, but gastrin was more active and less prone to tachyphylaxis than pentagastrin. The pharmacological analysis of the mode of action of gastrin suggests that the hormone causes contractions by stimulating receptors on or in the muscle cell. An action on intrinsic nerves is excluded since ganglion blockade, local anesthetics, anticholinesterases, or hyoscine did not alter the response of the muscle strips to gastrin. It is suggested that gastrin may play a physiological role in the control of gastric motor activity.

1810 MOTOR RESPONSES OF THE HUMAN ALIMENTARY TRACT TO NEAR-MAXIMAL INFUSIONS OF PENTAGASTRIN. *(E.)* Misiewcz, J. J. (Central Middlesex Hosp., London, England), D. J. Holdstock and S. L. Waller. *Gut* 8(5):463-479, 1967.

Motor responses of the gastrointestinal tract were measured in 32 patients during i.v. infusion of pentagastrin given in doses sufficient to raise gastric acid secretion to near maximal levels. Pentagastrin stimulated both antral motor activity and the secretion of acid. Histamine and Histalog increased acid secretion while antral motor activity remained unchanged, suggesting that stimulation of the parietal cell takes place without the endogenous release of gastrin. Activity of the right and left colon did not alter during the infusion of pentagastrin. The results suggest that direct motor effects of pentagastrin may be confined to the stomach.

1811 EFFECT OF THE NORMAL MICROBIAL FLORA ON GASTROINTESTINAL MOTILITY. *(E.)* Abrams, G. D. (U. Michigan Med. Sch., Ann Arbor) and J. E. Bishop. *Proc. Soc. Exp. Biol. Med.* 126(1):301-304, 1967.

Gastrointestinal transit, studied by means of Yttrium^{91} (1 μC, intragastrically) in CD-1 Swiss mice of both sexes, was significantly faster in conventional animals than in their germfree counterparts. At 16 hours, the stomachs of conventional mice retained only traces of test meals, while germfree animals contained over 25% of the total amount; the difference was still apparent at 24 hours. Within 16 hours of feeding, conventional animals had passed over 90% of the radioactivity into the feces, as compared to less than 30% in the germfree mice. The results of the present study confirm previous suggestions that normal flora may contribute to the defense of the small intestine against bacterial invasion by stimulating peristaltic emptying.

1812 EXTRAHEPATIC BILE DUCT MOTILITY. *(E.)* Daniels, B. T. (Denver Clin., Colorado), F. B. McGlone and H. E. Shuey. *Amer. J. Gastroent.* 48(3): 198-204, 1967.

Extrahepatic bile ducts from 75 autopsy specimens, 10 common duct-ligated, choledochoduodenostomized-cholecystectomized mongrel dogs, and 10 cholecystectomized patients were investigated in an attempt to verify intrinsic common bile duct motility. Pressure studies were conducted on the dogs before and after eating; the 10 patients had common duct pressure studies and cinefluorographic studies performed by catheterization of the cystic duct stump. Thirteen of the 75 autopsy specimens showed evidence of smooth muscle close to the outer layers. No experimental animal or patient exhibited any uniequivocal intrinsic common bile duct motility. The possibility that choledochal spasm may exist in some patients is worth further investigation.

1813 **REFLEX CONTROL OF THE MOTILITY OF THE SMALL INTESTINE.** *(Rev.)(E.)* Barány, F. (St. Erik's Hosp., Stockholm, Sweden). *Amer. J. Dig. Dis.* 13(5):455-459, 1968.

1814 **SOME ASPECTS OF TRANSMISSION AT THE NERVE-SMOOTH MUSCLE JUNCTION IN THE LONGITUDINAL MUSCLE OF THE GUINEA PIG ILEUM.** *(Rev.)(E.)* Kosterlitz, H. W. (Dept. Physiol., U. Aberdeen, Scotland) and A. L. Cowie. *Amer. J. Dig. Dis.* 13(5):415-417, 1968.

1815 **RELATIONSHIP BETWEEN *IN VITRO* STUDIES OF GASTROINTESTINAL MUSCLE AND MOTILITY OF THE ALIMENTARY TRACT *IN VIVO*.** *(Rev.)(E.)* Bennett, A. (King's Coll. Hosp. Med. Sch., London, England). *Amer. J. Dig. Dis.* 13(5):410-414, 1968.

1816 **MEASUREMENT OF INTRALUMINAL PRESSURES: RADIOTELEMETRY, DESIGN OF MANOMETRIC STUDIES, AND COMPUTER ANALYSIS OF RECORDS.** *(Rev.)(E.)* Misiewicz, J. J. (Cent. Middlesex Hosp., London, England). *Amer. J. Dig. Dis.* 13(5):389-396, 1968.

1817 **COMPUTER ANALYSIS OF INTRALUMINAL PRESSURE RECORDS.** *(E.)* Misiewicz, J. J. (Cent. Middlesex Hosp., London, England), S. L. Waller, M. J. R. Healy and E. A. Piper. *Gut* 9(2):232-236, 1968.

1818 **RECENT DATA ON THE ULTRASTRUCTURE AND INNERVATION OF GASTROINTESTINAL SMOOTH MUSCLE.** *(Rev.)(Fr.)* Couturier-Turpin, M. H. (Sch. Med., Paris, France). *Presse Med.* 76(7):319-321, 1968.

1819 **TRANSMISSION OF EXCITATION FROM THE PARASYMPATHETIC NERVE TO THE SMOOTH MUSCLE.** *(E.)* Ohashi, H. (Fac. Vet. Med., U. Hokkaido, Sapporo, Japan) and A. Ohga. *Nature* 216(5112):291-292, 1967.

1820 **EFFECT OF SOME SPASMOLYTIC DRUGS ON SMALL INTESTINE MOTILITY.** *(Rus.)* Khlystov, V. G. *Klin. Med.* 66(2):99-105, 1968.

1821 **A STUDY OF MOTOR EFFECTS OF GASTRIN ON THE DUODENUM.** *(E.)* Lanfranchi, G. A. (Inst. Path. Spec. Med., U. Bologna, Italy), P. Vezzadini, F. Miglio, L. Barbara and G. Fontana. *G. Clin. Med.* 48(12):1388-1400, 1968.

1822 **STUDIES OF THE MODE OF ACTION OF LARGACTIL ON GASTRIC MOTILITY.** *(Fr.)* Glavtcheva, L. (Inst. Physiol., Bulgarian Acad. Sci., Sofia, Bulgaria). *Rev. Roum. Physiol.* 5(1):51-62, 1968.

See also abstract nos.: 1801,1855,2006

1823 THE ROLE OF ATP CITRATE LYASE IN THE TRANSFER OF ACETYL GROUPS IN RAT LIVER. *(E.)* Daikuhara, Y. (Osaka U. Dent. Sch., Japan), T. Tsunemi and Y. Takeda. *Biochim. Biophys. Acta* 158(1):51-61, 1968.

ATP citrate lyase, an enzyme which catalyzes the breakdown of citrate to oxaloacetate and acetyl-CoA in the presence of ATP, was purified from rat liver and used to prepare the anti-enzyme by repeated injection into rabbits as previously described. The purified rabbit antibody was then used to investigate the role of this enzyme in the transfer of acetyl groups across the mitochondrial membrane. Using a reconstructed normal rat liver homogenate prepared from fed rats and containing both mitochondria and supernatant, treatment of the supernatant with the anti-enzyme reduced the acetylation of either sulfanilamide or p-toluidine, with pyruvate as the source of acetyl groups, to about 15% of that in controls. This reduction in the rate of acetylation was completely reversed by addition of excess purified ATP citrate lyase. In preparations of isolated mitochondria, the acetylation of these compounds was proportional to the amount of ATP citrate lyase added. Liver homogenates prepared from fasted or alloxan-diabetic rats showed essentially the same properties, and neither dextro- nor levo-carnitine had any effect on the acetylation rate under any conditions. It is concluded that more than 80% of the extramitochondrial acetyl-CoA in rat liver, derived from pyruvate via the mitochondria, is supplied through the ATP citrate lyase pathway, even in the fasted or diabetic state.

1824 BIOCHEMICAL AND HISTOCHEMICAL OBSERVATIONS ON β-GLUCURONIDASE IN THE MAMMALIAN GALLBLADDER. *(E.)* Ballantyne, B. (Sch. Med., U. Leeds, Yorkshire, England) and W. G. Wood. *Amer. J. Dig. Dis.* 13(6):551-557, 1968.

Biochemical studies on homogenates of gallbladders removed from male and female Flemish giant rabbits and guinea pigs, killed by an overdose of sodium pentobarbitone, revealed β-glucuronidase concentrations of 5.51 and 4.39 μmol/g/hr in male and female guinea pigs, resp., and 1.42 and 0.91 μmol/g/hr in male and female rabbits. The sex differences and species differences were both significant. In all cases, the pH optimum was 4.5 (in acetate buffer with an ionic strength of 0.1). Histochemical studies on 20-40 micron-thick frozen sections of gallbladder wall revealed high concentrations of enzyme in the cytoplasm of the epithelial cells, near the cell membrane, with lower concentrations in the smooth muscle and in the connective-tissue cells of the lamina propria. The enzyme was uniformly distributed among the cells, and was consistently inhibited by incubation with saccharo-1:4-lactone. It is suggested that gallbladder β-glucuronidase may play a role in the absorption of sodium from hepatic bile, as well as in mitosis and the transport of bilirubin.

1825 A BLOOD-BILE GLUCOSE BARRIER IN MAN. *(E.)* Schein, C. J. (Montefiore Hosp., New York City), B. Zumoff, J. Kream, J. Cassouto and L. Hellman. *Gastroenterology* 54(6):1094-1097, 1968.

Chemical analysis of bile obtained from 10 patients (2 men and 8 women, 34-72 yr old) with postcholecystectomy T-tube bile drainage on the 6th-9th postoperative day, both while fasting and during hyperglycemia induced by administration of glucose (50 g i.v. or 65-100 g p.o.) or glucagon (1 mg i.m.), revealed a virtual absence of free glucose under all conditions. No glucose was detected in fasting bile, nor in 9 patients with blood sugar levels of 125-405 mg%. In one patient with induced hyperglycemia of 486 mg%, the bile showed a glucose level of 8 mg%. Glucose was determined by the glucose-oxidase method. These results suggest a physiologically determined blood-bile barrier for glucose in man. Since orally administered xylose appeared in the bile in concentrations similar to those in the plasma, the barrier to glucose is probably due to active reabsorption of the glucose entering the bile by passive diffusion. It is of interest that glucose is also usually absent from dog bile (Woodyatt, *J. Biol. Chem.* 7:133, 1909), but preliminary studies have shown that this is not the case in rats.

1826 THE CLEARANCE OF MANNITOL AND ERYTHRITOL IN RAT BILE. *(E.)* Forker, E. L. (U. Iowa Coll. Med., Iowa City), T. Hicklin and H. Sornson. *Proc. Soc. Exp. Biol. Med.* 126(1):115-119, 1967.

The increase of erythritol (erythritol-^{14}C; 2.5 μC, i.v.) and mannitol (mannitol-^{3}H; 12.5 μC, i.v.) excretion in the bile induced by dehydrocholate choleresis was greater in the rat than in the guinea pig and significantly higher for mannitol. The rate of clearance change in the rat following dehydrocholate was also higher for mannitol, but not for erythritol. The differences suggest a significant species difference in relative permeability of the biliary tree to these solutes. The choleretic response of the rat to secretin was less than 10% of the response noted in the guinea pig, while the reverse was true for the changes in biliary clearance. Contrary to previous reports that mannitol is concentrated in rat bile, bile:plasma concentration ratios greater than unity were not noted for either mannitol erythritol. In both species studied, the extracellular fluid volume of skeletal muscle (as estimated from the plasma equivalent tissue space of mannitol) was twice as large for abdominal wall muscle as for gastrocnemius. The discrepancy is attributed to the fact that abdominal wall muscle has a higher proportion of fibrous connective tissue which, being relatively acellular, has a large tissue space for extracellular markers.

1827 CLEARANCE STUDIES OF INSULIN AND NONSUPPRESSIBLE INSULIN-LIKE ACTIVITY (NSILA) IN THE RAT LIVER. *(E.)* Solomon, S. S. (Dept. Med., U. Washington, Seattle), L. F. Fenster, J. W. Ensinck and R. H. Williams. *Proc. Soc. Exp. Biol. Med.* 126(1):166-169, 1967.

Intact rat livers (14-15 g) from male Sprague-Dawley rats were perfused with 80 ml of heparinized, diluted (1:3 with Ringer's solution) rat blood in an attempt to study the liver clearance of 100 mg (300 microunits/mg) of porcine nonsuppressible insulin-like activity (NSILA) and crystalline porcine insulin during a 4-hr perfusion; NSILA and insulin were added to the perfusates after a 1-hr control period. Serial samples were taken throughout the remaining experimental period. The half-life of porcine insulin in the rat perfusion system was determined graphically to be 14 minutes; NSILA had a half-life of 63 minutes. When calculated from Burgi's formula, the half-life for insulin and NSILA were 15 and 67 minutes, resp. The half-life of NSILA is 4-5 times that of insulin; NSILA liver clearance may be related to uptake by the reticulo-endothelial system rather than to inactivation at a biological site. It is possible that NSILA's prolonged half-life may partly explain the lack of acute changes in serum concentrations of this material during physiological experimentation.

1828 **INSULIN AND INSULIN-LIKE ACTIVITY IN THE BILE OF RABBITS.** *(E.)* Lopez-Quijada, C. (G. Maranon Inst., Madrid, Spain) and J. L. R. Candela. *Proc. Soc. Exp. Biol. Med.* 126(1):209-212, 1967.

In an attempt to elucidate whether insulin undergoes any modification while passing from plasma to bile, hepatic bile samples with a low 20 microunit/ml concentration of immunoreactive insulin (IRI), and bile samples with high IRI concentrations, collected under similar experimental conditions but after large doses of insulin, were taken from choledochus-cannulated rabbits. Bile insulin-like activity (BILA) was determined by the rat epididymal fat assay; IRI by the Hales and Randle technique. Glucose uptake with bile was slightly higher than that with a similar concentration of crystalline insulin. These differences may represent small amounts of insulin-like activity not detectable immunologically. BILA was not completely suppressed when incubated with anti-ox-insulin serum. The results, therefore, suggest some modification of insulin as it circulates through the liver.

1829 **MAGNESIUM DEFICIENCY AND UREA CYCLE ENZYMES IN RAT LIVER.** *(E.)* Lizzarralde, G. (West Virginia U. Med. Ctr., Morgantown), V. E. Mazzocco and E. B. Flink. *Proc. Soc. Exp. Biol. Med.* 126(1):249-251, 1967.

Holtzman albino female rats (150-200 g) were fed either 15 g/day of a control diet containing 2.0165 mEq of magnesium or a magnesium deficient diet containing 0.0165 mEq to study the influence of magnesium deficiency on the urea cycle enzymes. The animals were sacrificed at the end of 30 days and the livers removed, weighed, and homogenized in a ratio of 1 g of liver to 9 ml of 0.1% cetyltrimethyl ammonium bromide; liver protein and enzyme concentrations were measured in the supernatant of the centrifuged homogenates. Deficient rats exhibited weight loss and other symptoms of magnesium deprivation; the difference between deficient and control animals was significant. Differences in liver weight and protein content in the 3 groups were not statistically significant. Ornithine transcarbamylase was the only enzyme whose content was significantly decreased by magnesium deficiency. The reason for enzymatic changes in magnesium deficiency are unknown, but considerations now under investigation include the pyrimidine synthesis pathway and the effect of deficiency on enzyme kinetics.

1830 **DEVELOPMENT OF UREA-SYNTHESIZING ENZYMES IN HUMAN LIVER.** *(E.)* Raiha, N. C. R. (Helsinki U. Central Hosp., Finland) and J. Suihkonen. *Acta Paediat. Scand.* 57(2):121-124, 1968.

The actual overall rate of urea synthesis was determined in human liver slices of 16 to 20-week old fetuses; 0.3 mm slices were incubated in 3 ml of Krebs-Ringer-bicarbonate buffer gassed with 95% O_2 and 5% CO_2 and containing 200 μmoles of NH_4Cl, 12 μmoles of L-ornithine, 60 μmoles of DL-lactate, and 28 μmoles of glucose. All the livers studied produced urea. The activity of the urea-synthesizing enzymes carbamyl phosphate synthetase, ornithine transcarbamylase, argininosuccinase and arginase, determined by the Brown and Cohen technique, was shown to be slightly lower in the fetal and newborn liver than in the adult, although considerable activity is present at a very early fetal stage. The present study shows that the developmental pattern of the urea-synthesizing enzymes in the human differs from that previously obtained in rats. This study supports the view that data obtained from experimental animals should not be applied to human development.

1831 **AUTOREGULATION OF GLUCOSE METABOLISM IN THE ISOLATED PERFUSED RAT LIVER.** *(E.)* McCraw, E. F. (Indiana U. Sch. Med., Indianapolis), M. J. Peterson and J. Ashmore. *Proc. Soc. Exp. Biol. Med.* 126(1):232-236, 1967.

Isolated livers from male albino Wistar strain rats (200-250 g) were used to study autoregulation of glucose production and utilization; livers from normal fasted, alloxan-diabetic, and adrenalectomized rats were perfused with media containing glucose concentrations of 0-1000 mg/100 ml. In the normal fasted rat, the point at which glucose production equalled utilization was 200 mg/100 ml; the rate of glucose utilization for adrenalectomized was almost the same as that for normal rats. However, adrenalectomized animals exhibited a decrease in total glucose production; the point at which glucose production and utilization were equal was 60 mg/100 ml. Livers from alloxan-treated rats showed a high rate of glucose production with low initial glucose concentrations in the medium; glucose production and utilization were equal at 340 mg/100 ml. The results from diabetic animals suggest that the rate of liver glucose utilization depends on its rate of phosphorylation. The plateau occurring in the diabetic rat glucose utilization curve is thought to represent an equilibrium between glucose and glucose-6-phosphate.

1832 **RENAL EXCRETION OF BILIRUBIN BY THE RAT.** *(E.)* Ali, M. A. M. (Roy. Free Hosp., London, England) and B. H. Billing. *Amer. J. Physiol.* 214(6): 1340-1345, 1968.

Fifty-two bile duct-ligated male Sprague-Dawley rats (200-400 g) were used to assess the role of glomerular filtration in the renal excretion of conjugated bilirubin and to study the effects of protein-binding competitors of bilirubin and renal tubule secretion inhibitors on urinary bile pigment excretion; the substances used to alter the protein binding of conjugated bilirubin were sulfisoxazole, sodium taurocholate, sodium salicylate, and bovine albumin. Sodium *p*-aminohippurate (PAH) and probenecid acted as tubule secretion inhibitors. Compounds which acted as bilirubin competitors increased the urinary excretion of bilirubin. Probenecid and PAH increased bile pigment excretion; thus, tubular secretion is of little importance in bilirubin excretion. The primary mechanism in bilirubin excretion involves glomerular filtration of a small diffusible fraction of conjugated bilirubin in the plasma.

1833 **INHIBITION OF A HEPATIC MICROSOMAL ENZYME SYSTEM AFTER HEAD X-IRRADIATION OF RATS.** *(E.)* Nair, V. (Chicago Med. Sch., Ill.) and D. Bau. *Proc. Soc. Exp. Biol. Med.* 126(3):853-856, 1967.

Exposure of pregnant female Sprague-Dawley rats to 25 or 50 r doses of X-irradiation on the 14th day of gestation suppressed the development of the liver hexobarbitol-metabolizing enzyme system in male offspring such that they resembled females in enzyme activity; no effect was observed on female offspring. The postnatal series consisted of 3 groups of 21-day old male rats given total body irradiation, head irradiation with the body shielded, or body irradiation with the head shielded. A single 200 r irradiation suppressed enzyme development in all animals, but the magnitude of suppression was less than in prenatally irradiated animals. The head or body of adult rats was exposed to 500 r, 1000 r, 2000 r, or 10,000 r of X-irradiation; unexposed parts were shielded. Hepatic enzyme activity, measured 3 days after exposure, was unaffected in 500 r head-irradiated rats; doses of 500 r or more suppressed activity in body-irradiated rats and 1000 r or more suppressed activity in head-irradiated rats. This abscopal inhibition of the hepatic enzyme system at higher doses of X-irradiation suggests that the central nervous system plays a regulatory role not only in the development, but also in the maintainence of the optimal level of liver enzyme activity.

1834 **EFFECT OF TRANSPLANTED TUMOR AND VARIOUS AGENTS ON LIVER REGENERATION DURING PREGNANCY.** *(E.)* Gershbein, L. L. (Dept. Biochem., Northwest Inst. Med. Res., Chicago, Ill.). *Proc. Soc. Exp. Biol. Med.* 126(1):88-92, 1967.

The study of liver regeneration in partially hepatectomized nonpregnant and gravid adult Holtzman rats with Walker tumor transplanted at surgery, revealed that liver weight restoration was higher in the pregnant animals than in those fed a diet supplemented with 0.25% acenaphthene for 7 days; the presence of the tumor did not influence the process. Tumor growth was faster in the hepatectomized animals than in all the sham-operated rats. The effect of pregnancy in operated rats on the control diet was higher than that of the various liver regeneration stimulating agents added to the diet for 10.5 days: thalidomide, 0.25%; phenylbutazone, 0.35%; asnic acid, 0.20%; 2,4-dithiopyrimidine, 0.050%. In control pregnant rats, dietary 2,4-dithiopyrimidine accelerated liver regeneration, thalidomide had no effect, and nicotinamide (0.35%) normalized the extent of liver regeneration.

1835 **ROLE OF RIBONUCLEIC ACID IN EXPERIMENTAL PORPHYRIA.** *(E.)* Hickman, R. (U. Cape Town Med. Sch., S. Africa), S. J. Saunders, E. Dowdle and L. Eales. *Lancet* 2(7517):656-658, 1967.

1836 **ACTIVATION OF GLUCOSE-6-PHOSPHATASE OF RAT LIVER AT HIGH pH: DIFFERENTIAL RESPONSE OF BASAL AND INDUCED ACTIVITIES.** *(E.)* Pandhi, P. N. (Roy. Free Hosp. Sch. Med., London, England) and H. Baum. *Nature* 216(5122):1324-1325, 1967.

1837 **INFLUENCE OF THE INJECTION OF 'TRITON WR-1339' ON LYSOSOMES OF A RAT TRANSPLANTABLE HEPATOMA.** *(E.)* Wattiaux, R. (Lab. Physiol. Chem., Fac. U., Notre Dame de la Paix, Namur, Belgium) and S. Wattiaux-de Coninck. *Nature* 216(5120):1132-1133, 1967.

1838 **HYDROCORTISONE INDUCTION OF TYROSINE TRANSAMINASE IN REGENERATING RAT LIVER.** *(E.)* Teebor, G. W. (New York U. Sch. Med., N. Y.), F. F. Becker and I. Seidman. *Nature* 216(5113): 396-397, 1967.

1839 **VARIATIONS DEPENDENT ON AGE AND DIET IN THE METABOLISM OF 7,12-DIMETHYLBENZ[a]-ANTHRACENE BY RAT LIVER HOMOGENATES.** *(E.)* Sims, P. (Chester Beatty Res. Inst., London, England) and P. L. Grover. *Nature* 216(5110):77-78, 1967.

1840 **EFFECTS OF DEHYDROEPIANDROSTERONE AND DIET PROTEIN ON LIVER ENZYMES AND LIPOGENESIS.** *(E.)* Tepperman, H. M. (State Univ. New York, New York City) and J. Tepperman. *Amer. J. Physiol.* 214(5):1126-1132, 1968.

1841 **WHITE BILE AS A SECRETION OF LIVER CELLS.** *(Rus.)* Zamychkina, K. S. (Inst. Normal Path. Physiol. Acad. Med. Sci. USSR, Moscow). *Biull. Eksp. Biol. Med.* 65(3):15-18, 1968.

1842 **EFFECTS OF VITAMIN D ON THE INTRACELLULAR DISTRIBUTION OF CALCIUM AND MAGNESIUM IN RAT LIVER.** *(Fr.)* Gounelle, J. C. (Lab. Physiol., Sch. Pharm., Paris, France) and Y. Raoul. *C. R. Soc. Biol. (Paris)* 161(5):995-998, 1967.

1843 **FEEDING SCHEDULE ALTERATION OF DAILY RHYTHM IN TYROSINE ALPHA-KETOGLUTARATE TRANSAMINASE OF RAT LIVER.** *(E.)* Fuller, R. W. (Lilly Res. Labs., Indianapolis, Ind.) and H. D. Snoddy. *Science* 159(3816):738, 1968.

1844 **RESULTS OF A TYPICAL LIVER RESECTION.** *(Ger.)* Lortat-Jacob, J. L. (Beaujon Hosp., Paris, France), F. Fekete and R. Giuli. *Actuelle Chir.* 3(3):169-178, 1968.

1845 **EVALUATION OF THE PORTAL BLOOD FLOW THROUGH INTRADUODENAL, AND TRANSDERMAL INTRASPLENIC INTRODUCTION OF ^{131}I.** *(Rus.)* Aripov, A. Ia. (Moscow, USSR). *Ter. Arkh.* (4):98-102, 1968.

1846 **ADAPTIVE ENZYME CHANGES IN LIVER AND MUSCLE OF RATS DURING PROTEIN DEPLETION AND REFEEDING.** *(E.)* Stephen, J. M. L. (U. West Indies, Jamaica). *Brit. J. Nutr.* 22(2):153-163, 1968.

1847 **REGULATORY ACTION OF IONS ON SOME MITOCHONDRIAL FUNCTIONS.** *(E.)* Gomez-Puyou, A. (Fac. Med., Ciudad U., Mexico City), M. Trena and A. Pena. Pp. 97-109 in *National Cancer Inst. Monograph 27: International Symposium Enzymatic Aspects of Metabolic Regulation.* Bethesda, Maryland National Cancer Inst. 1967. 335 pp.

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1848 PROTEIN TURNOVER AND THE REGULATION OF ENZYME LEVELS IN RAT LIVER. *(E.)* Schimke, R. T. (Stanford Univ. Sch. Med., Palo Alto, Calif.). Pp. 301-314 in *National Cancer Inst. Monograph 27: International Symposium Enzymatic Aspects of Metabolic Regulation.* Bethesda, Maryland National Cancer Inst. 1967. 335 pp.

1849 HORMONAL REGULATION OF LIVER ENZYME SYNTHESIS. *(E.)* Kenney, F. T. (Oak Ridge National Lab., Tennessee), D. Holten and W. L. Albritton. Pp. 315-323 in *National Cancer Inst. Monograph 27: International Symposium Enzymatic Aspects of Metabolic Regulation.* Bethesda, Maryland National Cancer Inst. 1967. 335 pp.

1850 A PRELIMINARY REPORT ON THE LONG-TERM EFFECTS OF AN ORAL CONTRACEPTIVE AGENT ON THE LIVER FUNCTION OF RABBITS. *(E.)* Joshi, U. M. (Seth G. S. Med. Coll., Parel, Bombay, India) and S. S. Rao. *Indian J. Med. Res.* 56(3): 314-320, 1968.

1851 EFFECT OF ADRENERGIC BLOCKING AGENTS ON BILE SECRETION. *(E.)* Kasture, A. V. (U. Dept. Pharm., Mahatma Gandhi Marg, Nagpur, India). *Indian J. Med. Res.* 56(3):339-343, 1968.

See also abstract no.: 1812

1852 A STUDY OF THE SERUM ALDOLASE TEST IN VARIOUS TYPES OF JAUNDICE. *(E.)*

Cohn, E. M. (Albert Einstein Med. Ctr., North. Div., Philadelphia, Pa.), S. Winsten and E. B. Abramson. *Amer. J. Gastroent.* 49(3):219-234, 1968.

In 45 patients with jaundice due to infectious hepatitis, cirrhosis, common duct stone or common duct malignancy, the results of 199 determinations of serum aldolase were compared with determinations of serum glutamic oxaloacetic transaminase (SGOT), glutamic-pyruvic transaminase (SGPT), alkaline phosphatase, thymol turbidity and cephalin-cholesterol flocculation. Abnormal serum aldolase levels were seen in 12 of 12 patients with infectious hepatitis (49 of 64 tests), 8 of 12 with cirrhosis (17 of 36 tests), 9 of 10 with common duct stone (20 of 29 tests), and 6 of 11 with common duct malignancy (22 of 47 tests). Critically high levels (above 20 U) were seen in only 6, 6, 1 and 3 of these patients, however (in 24, 12, 2 and 11 of the tests). Abnormal SGOT levels (above 40 U) were seen in 12 of 12 patients with infectious hepatitis (56 of 65 tests), 9 of 12 with cirrhosis (23 of 33 tests), 8 of 10 with common duct stone (17 of 29 tests), and 10 of 11 with common duct malignancy (39 of 49 tests). Critically high levels (above 400 U), however, were seen in only 3, 1, 1 and 0 of these patients. Abnormal SGPT levels (above 40 U) were seen in 12 of 12 patients with infectious hepatitis (57 of 63 tests), 7 of 12 with cirrhosis (13 of 23 tests), 6 of 10 with common duct stone (14 of 28 tests), and 10 of 11 with common duct malignancy (30 of 48 tests). Critically high levels (above 400 U), however, were seen in only 3 patients with infectious hepatitis (none of the others). Thymol turbidity was abnormal in 47 out of 66 studies performed on patients with infectious hepatitis, 27 of 33 studies in patients with cirrhosis, 5 of 28 studies in common duct stones and 13 of 49 studies in common duct malignancy. Cephalin flocculation tests were positive in 37 of 63 studies in infectious hepatitis, 8 of 31 studies in cirrhosis, 0 of 28 studies in common duct stone and 7 of 46 studies in common duct malignancy. Alkaline phosphatase levels were abnormal (above 12 U) in 30 of 65 studies on patients with infectious hepatitis, 8 of 32 studies in cirrhosis, 15 of 30 studies in common duct stone and 36 of 48 studies in common duct malignancy. Infectious hepatitis, followed by cirrhosis, thus resulted in the highest values of all the enzymes, while common duct stone led to a relatively low incidence of highly positive liver function tests. In the course of acute hepatitis, the highest values and greatest frequency of abnormal results occurred during the 2nd and 3rd week after the onset of jaundice. There was no significant time correlation in patients with cirrhosis or obstruction of the common bile duct. Critically high serum aldolase levels were also seen in 9 of 21 patients with hepatic malignancy, but not in 2 cases of hemolytic jaundice. It is concluded that the serum aldolase test compares favorably with the SGPT and SGOT in the diagnosis of jaundice. Positive responses to the serum aldolase test were elicited in some cases of hepatocellular damage when other liver function tests were normal, and moderate elevations of serum aldolase, along with increases in serum alkaline phosphatase, were associated with obstructive jaundice due to malignancy of the extrahepatic biliary tract and/or liver. It is felt, however, that greater sensitivity in differentiating types of jaundice is achieved if the critical level is established at 20 U rather than 10.

1853 INTESTINAL PARASITISM IN KOREA. *(E.)*

Pomerantz, B. (Montefiore Hosp., Bronx, N. Y.) and J. C. Lorber. *Amer. J. Gastroent.* 49(3):209-218, 1968.

Between December 1965 and August 1966, 175 Koreans (126 men and 49 women, 19-58 yr old) were treated for helminth infestation *(Trichuris trichiura, Ancylostoma duodenale, Ascaris lumbricoides, Clonorchis sinensis,* and *Trichostrongylus orientalis,* in order of frequency) in the village of Pyeontaek, South Korea. Only 21 of these had singular infestations (14 of 21 due to *Trichuris*); 62 harbored both *Trichuris* and *Ancylostoma*, and 37 others harbored these two parasites plus *Ascaris*. Ascariasis was treated with piperazine citrate (3.5 g/day x 2), hookworm infestation (ancylostomiasis) was treated with tetrachloroethylene (4-5 cc once), *Trichuris* and *Trichostrongylus* were both treated with dithiazanine iodide (200 mg 3 times daily for 7 days as enteric-coated tablets), and the Chinese liver flukes were treated with chloroquine phosphate (0.5 g twice daily for 3 days and then daily for 20 days). Results of treatment could be evaluated in 118 cases. Cures (disappearance of ova from the stools after 1-3 courses of treatment) were obtained in 77 of 103 cases of trichuriasis, 67 of 85 cases of ancylostomiasis, 50 of 51 cases of ascariasis, 3 of 15 cases of clonorchiasis, and all 6 cases of trichostrongyliasis. No side effects were observed with piperazine citrate, and chloroquine produced only mild diarrhea. Tetrachloroethylene produced dizziness and nausea in about 33% of the cases, usually lasting 2-3 hr. In the dosage of dithiazanine used, gastrointestinal disturbances were frequent, although usually mild (nausea, vomiting and loose stools). In a few cases, the side effects were so severe that treatment had to be discontinued. In the course of a detailed review (36 refs.) of the incidence, pathology, diagnosis and treatment of helminthiasis, it is noted that dithiazanine has now been withdrawn from the market and is usually replaced by thiabendazole. Attention is called to the endemic nature of helminth infestation, usually asymptomatic, in Asia and to the probability that infections of this type will be encountered with increasing frequency among returning U.S. servicemen in the years to come.

1854 A NEW METHOD OF OBJECTIVE EXAMINATION IN PROCTOLOGY. *(E.)*

Kerremans, R. P. J. (St. Rafael Acad. Hosp., Louvain, Belgium). *Gut* 9(2):243-245, 1968.

A new molding technique is presented which yields faithful reproductions of the anal canal and lower rectum. A semiliquid mixture of stearic acid, resin and talc (Kerr soft green No. 2 impression compound sticks) at 48C is injected into the anus from a plastic syringe as the syringe is withdrawn, after which the material is allowed to harden for about 3 min while still in contact with the nearly empty syringe. The cast can then be withdrawn by pulling on the syringe, enabling the structural relations of the rectum, anal canal and pelvic outlet to be studied at leisure during fecal continence (with a contracted anal canal) and during defecation. It is suggested that deviations from normal anatomical parameters, provided the molding conditions are kept carefully constant, may be an expression of abnormal anal function. The resting anus, however, cannot be studied in this way. The technique may be useful in the diagnosis of anal abnormalities and in follow-up examinations after anal surgery.

1855 NEW CLINICAL METHOD FOR MEASURING THE RATE OF GASTRIC EMPTYING: THE DOUBLE SAMPLING TEST MEAL. *(E.)* George, J. D. (Roy. Victoria Hosp., Belfast, North. Ireland). *Gut* 9(2):237-242, 1968.

A technique is described by which the emptying pattern for an individual stomach can be obtained in a single test, using the principles of dye dilution and double sampling. A test meal consisting of 750 cc of phenol red having a concentration of about 30 ppm (measured exactly before use) is given to the fasting patient, following removal of resting gastric juice, and a sample is withdrawn from the stomach 10 min later. This is followed immediately by addition of 20 ml of concentrated phenol red (550 ppm) through the tube, mixing, and withdrawal of a 2nd sample. The volume of the stomach contents can then be calculated from the two concentrations, and repetition of the entire procedure at 10-min intervals enables the emptying pattern of the stomach to be determined. If desired, the acidity of each sample can also be measured in order to evaluate gastric secretion. Control studies have shown that the method is accurate and reliable, yielding consistent results which correlate well with those of Hunt's serial test meal method. Studies in 20 normal controls (14 men and 6 women, 19-71 yr old), 20 patients with duodenal ulcer (16 men and 4 women, 20-68 yr old) and 20 patients with gastric ulcer (8 men and 12 women, 32-72 yr old) revealed no significant difference in "starting index" (the extrapolated regression line reached log 750 at a mean of 2.7-3.7 min after 0 time) and no significant difference between duodenal ulcer patients and controls in the rate of gastric emptying. Gastric ulcer patients, however, showed a highly significant increase in both emptying time (104 min compared to 72 min in controls and 81 min in duodenal ulcer) and half-life (16 min compared to 11 min in controls and 13 min in duodenal ulcer). This is interpreted as a delay in emptying caused either by a loss of propulsive power in the stomach or by an increased resistance to emptying which is maintained throughout the emptying process. In 3 other patients with gastric ulcer, an abnormal emptying pattern was found in which the delay was apparently caused by difficulty in expressing the final 100-200 ml of gastric contents.

1856 REPRODUCIBILITY OF THE HEPATIC UPTAKE TEST OF VITAMIN B$_{12}$ ABSORPTION. *(E.)* Townsend, J. D. (Cent. Middlesex Hosp., London, England), T. Smith and M. J. S. Langman. *Gut* 9(2):199-202, 1968.

The hepatic uptake of ^{58}Co-labeled cyanocobalamin (0.5 μC by mouth 7 days before scintillation scanning of the liver) was determined on two occasions, 1 week to 1 month apart, in 10 patients with pernicious anemia and achlorhydria, 10 patients with malabsorption syndromes (idiopathic steatorrhea, Crohn's disease, tropical sprue, amyloidosis, abdominal lymphoma, Zollinger-Ellison syndrome), 15 patients with prior partial gastrectomy (Billroth I or Polya 1-17 yr before), and 10 controls without gastrointestinal disease. Anterior uptake measurements yielded the following mean values (cpm/μC) for the control, pernicious anemia, partial gastrectommy, and malabsorption patients, resp., after 7 days: 896, 42, 593 and 632; the corresponding values at the time of the 2nd measurement were 988, 89, 788 and 834. In 23 of the 35 patients without pernicious anemia, the 2nd measurement was higher than the first, suggesting continued uptake by the liver after 7 days. The highest correlation between the first and 2nd measurements ($r = 0.86$) was obtained in patients with malabsorption, followed by those with partial gastrectomy ($r = 0.61$) and the controls ($r = 0.49$); the correlation coefficient for patients with pernicious anemia was only 0.20, due probably to the low uptake in these patients. There was a clear separation between control values and values in the pernicious anemia group both times. Among patients with values consistently in the normal range (all controls, 14 of 15 with partial gastrectomy and 8 of 10 with malabsorption), there was still considerable variation, the mean difference between pairs of measurements being 352 cpm/μC or 47% of the original value; this is ascribed in part to the uniform increase in uptake by the liver. These results show that the hepatic uptake test should be interpreted with care in patients with malabsorption (2 of 10 showed subnormal values in the 2nd measurement), and that repeated studies on individual patients are not a reliable way of establishing whether the capacity to absorb vitamin B$_{12}$ has improved or deteriorated.

1857 USE OF A DIET SUPPLEMENT IN LAENNEC'S CIRRHOSIS. *(E.)* Peters, R. S. (Fresno Gen. Hosp., Calif.), A. Longtin and J. D. Boyle. *Gastroenterology* 54(5):872-875, 1968.

A palatable, low-sodium supplement of vegetable oil, milk protein and carbohydrate, providing 1500 calories/day in a volume of only 480 ml, was used to increase the nutritional value of the diet in 16 male patients under treatment for decompensated Laennec's cirrhosis of moderate severity associated with chronic alcoholism and mild-to-moderate hyperbilirubinemia, but no signs of hepatic coma. The dosage given was 120 ml 4 times daily (after meals and before bedtime) for a total of 9-19 days, either continuously (in 13 patients) or for courses of 3 days separated by 3-day intervals. Only 5 of the 16 patients developed sufficient intolerance to require discontinuation of the treatment, and the supplement was generally well accepted. One patient with diabetes showed increased glucosuria, one post-gastrectomy patient with a mild dumping syndrome developed severe dumping after each dose, and two others developed mild hepatic encephalopathy. Addition of the supplement did not depress the consumption of the basic hospital diet, and as a result total food intake doubled: caloric intake from 1200-1500 to 2700-3000 calories per day and protein intake from 48-58 to 90-100 g/day. Administration of a dietary supplement of this type, as a "medicine" rather than as a "food," may be a convenient way of providing the necessary nutrition to cirrhotic patients with poor appetites.

1858 AN ANALYSIS OF LIMITATIONS, FAILURES, PATIENT ACCEPTANCE AND ADVANTAGES OF THE GASTROCAMERA IN PRIVATE PRACTICE. *(E.)* Berry, M. (Emory U. Sch. Med., Atlanta, Ga.). *Amer. J. Gastroent.* 49(4):341-348, 1968.

Of 121 procedures carried out with the Olympus Gastrocamera on 100 consecutive patients, 18 were failures: 12 due either to large amounts of gastric mucus and secretion or to inadequate inflation of the stomach, 3 due either to a blob of mucus obscuring the lens or to instrument failure, and 3 due to violent gagging on the part of the patient despite adequate pharyngeal anesthesia. Thus, 3% of the patients could or would would not cooperate, and 2 of 19 requests for restudy were refused, but 16 new patients were referred by old patients and 6 doctors referred more than one patient apiece (total of 28). It is therefore a well tolerated procedure which has the significant advantages of ease of performance, low cost, rapidity and reproducibility, and freedom from complications. On the other hand, illumination of the fundus is sometimes inadequate, it is difficult to be sure how much of the fundus and greater curvature has been photographed, or what is the actual size of a visualized lesion, and 4-5 out of every strip of 32 frames will be of little or no value due to the lens being too close to the mucosa. The Gastrocamera was of value in revealing definite organic disease in approximately 50% of 62 patients with epigastric distress, including 5 gastric ulcers, 17 cases of gastritis with or without erosions, 7 cases of atrophic gastritis, 1 gastric polyp, and 2 occult duodenal ulcers revealed by deformity of the pylorus. The camera was also useful following gastric surgery, to check on negative X-rays obtained after healing of benign gastric ulcers, and to evaluate the severity of prolapse of the gastric mucosa through the pylorus. It is concluded that the advantages of this technique far outweigh its limitations, although of course the limitations must be recognized in the interpretation of the results.

1859 REHFUSS FRACTIONAL GASTRIC ANALYSIS: A STUDY OF SECRETORY AND MOTOR FUNCTION OF THE STOMACH. *(E.)* Lukash, W. M. (Natl. Naval Med. Ctr., Bethesda, Md.). *Amer. J. Gastroent.* 49(4): 318-327, 1968.

The results of Rehfuss fractional gastric analysis as modified by Backus, utilizing an Ewald test meal of bread and water, were compared in 278 male patients with duodenal ulcer, 29 with gastric ulcer, and 191 male controls with miscellaneous conditions, including functional gastrointestinal disease, hiatus hernia and esophagitis, gastritis, cirrhosis, pancreatitis, cholelithiasis and others. Delayed motility (a fasting residuum of more than 50 ml) was observed in 37% of duodenal ulcer patients, 48.3% of gastric ulcer patients and 34.6% of controls. Fasting hyperacidity (a fasting free acid level of more than 20 mEq/liter) was observed in 54.7%, 62.1% and 39.3%, resp., while stimulated hyperacidity (a peak acid level of more than 50 mEq/liter) was detected in 83.5% of duodenal ulcer patients, 72.4% of gastric ulcer patients and 59.6% of controls. In all three groups, however, the peak acidity was noted most commonly 75-90 min after the test meal. Gastric retention (a residuum of more than 50 ml 2 hr after the meal) was seen in only 17.6%, 24.1% and 17.3% of these groups, but this may have been due to the fact that only fluid residuum and not gross food residue was considered. Among 150 patients who were eventually subjected to surgery for gastric (24) or duodenal (126) ulcers, 54-88% had hyperacidity and 42-54.7% had gastric retention. Following partial gastrectomy or vagotomy and drainage, the incidence of hyperacidity was reduced to 5.8-11.76% among 17 patients treated for gastric and 85 treated for duodenal ulcers, while the incidence of gastric retention was still relatively high (17.6% among those treated for duodenal ulcer and 42.3% among those treated for gastric ulcer). It is concluded that the Rehfuss technique has distinct advantages over other tests in that gastric motility, the function of the stomach in the chymification of food, and gastric emptying can all be evaluated in addition to gastric acidity. These results can be utilized clinically in the selection of patients for peptic ulcer surgery and in the postoperative evaluation of acid secretion and gastric emptying.

1860 PERCUTANEOUS LIVER BIOPSY IN CHILDREN. PART I. METHODOLOGY, INDICATIONS, COMPLICATIONS AND CONTRAINDICATIONS. *(Ger.)* Gmyrek, D. (Charite Hosp., Berlin, Germany) and W. Kunz. *Kinderaerztl. Prax.* (4):161-175, 1968.

In a detailed discussion of liver biopsy, based on a review of the literature (approximately 100 refs.) and experience with over 300 personal cases, the Menghini technique is concluded to be the safest and most productive method for both adults and children. The advantages of the Menghini technique (shortening of the dangerous intrahepatic stage to fractions of a second, eliminating problems with breath-holding; the use of smaller needles, resulting in a decreased danger of bleeding; and better preservation of the structure of the hepatic tissue specimen) are pointed out and some of the preparations necessary before the technique is carried out in infants or children are outlined. Liver biopsy is particularly indicated for the diagnosis of diffuse liver disease manifested by hepatomegaly, splenomegaly, apparently idiopathic jaundice and/or abnormal liver function tests. These can be caused by various types of hepatitis, cirrhosis, biliary atresia, post-hepatitic or cholestatic jaundice, cholangitis, metabolic diseases, diseases of the hematopoietic system, systemic infection, fatty liver, toxic liver damage, or blood group incompatibility. Among the 300 children subjected to percutaneous liver biopsy by the authors, 24 complained of transitory pain in the right shoulder or (more rarely) in the epigastrium; 5 showed moderate bleeding from the skin wound, while in 7 cases blood (6 cases) or bile (1 case) was aspirated with the liver tissue. There was only one serious complication, a case of intracapsular hemorrhage in an 11-yr-old girl with acute leukemia. A review of the literature reveals hemorrhage, peritonitis and pleuritis or pneumothorax to be the most common complications, with an overall incidence of about 0.11% and a mortality rate of 0.017% (statistics on adults). Liver biopsy in children is contraindicated by factors which might promote bleeding (hemorrhagic diathesis, congestion of the liver, portal hypertension, hepatic hemangiomatosis), factors which might increase the risk of peritonitis (cholangitis, liver abscess, subphrenic abscess, obstructive jaundice of long duration, echinococcosis, fever, inability to palpate the liver), and pleural empyema or pneumonia which increase the risk of pleuritis. With these kept in mind, however, liver biopsy is a safe and useful diagnostic procedure, even in infants.

1861 TWO-DIMENSIONAL ULTRASOUNDS IN LIVER DISEASES. *(E.)* Damascelli, B. (Inst. Radiol., U. Milan, Italy), G. Bonadonna, L. Roncoroni, C. Uslenghi and U. Veronesi. *J.A.M.A.* 204(11):105-110, 1968.

A modified two-dimensional ultrasonic pulse-echo (sonar) technique revealed abnormal echo patterns in all of 36 patients with suspected liver disease. There were no false positives, and there was a good correlation between ultrasonographic findings and the results of clinical examination, liver function tests, biopsy and scanning with radioactive gold. The technique is described in detail and methods are suggested for overcoming some of the existing deficiencies in equipment and procedure. In 16 patients with metastatic cancer of the liver (all with hepatomegaly and elevated sulfobromophthalein retention), the echogram uniformly showed numerous marked reflections and the liver surface appeared to be irregular; serum alkaline phosphatase levels were elevated in 13 of these patients and liver scans with radiogold were abnormal in 11 of 14 tested. In 5 patients with nodular cirrhosis and one with chronic passive congestion due to heart failure, the echo pattern showed numerous tiny reflections resembling dust. Abnormal echograms were also obtained in 3 patients with hepatomegaly (in one of whom the procedure aided in the detection of congenital cysts) and in 2 with gallstones; in one of the latter ultrasonography revealed stones which were not visible on X-ray, while in the other it revealed a dropsical gallbladder. Echography is superior to radiogold scanning in that it can distinguish between a solid and a cystic lesion, and can often detect smaller lesions, but it cannot yet provide a verdict as to the benign or malignant nature of a lesion. Ultrasonography is concluded to be a simple, rapid and safe screening procedure which can be a useful tool in the diagnosis of liver disease, particularly in conjunction with other findings.

1862 **THE DIAGNOSIS OF PORTAL HYPERTENSION WITH ^{131}I.** *(E.)* Lewitus, Z. (Tel Aviv U. Med. Sch., Israel) and J. Laor. *Israel J. Med. Sci.* 4(1):41-46, 1968.

Abnormal absorption curves for rectally administered radioactive iodine (40-50 μC of Na^{131}I), measured by scintillation counting over the right hypochondrium and left temporal region in order to record the curves from the systemic circulation and liver simultaneously, were obtained in 25 of 31 patients with suspected liver disease and in 0 of 29 controls. Those with abnormal curves (a relative delay in hepatic uptake of the isotope) included all 10 patients with confirmed cirrhosis, 7 of 10 with confirmed liver metastasis, and 8 of 11 with other diseases, including 3 "false positives" with congestive heart failure, irritable colon and vague gastrointestinal symptoms. Normal absorption curves were obtained in 3 patients with liver metastasis, 2 with acute hepatitis and one with familial nonhemolytic jaundice. Portal venous pressures were not determined in this study. The abnormal curves are said to result from the fact that in portal hypertension, the increase in portal venous pressure partially diverts the rectal venous blood from the portal circulation and causes its drainage at equal rates to the liver and through the systemic veins to the heart.

1863 **SERUM B_{12}– A DIAGNOSTIC TEST IN LIVER DISEASE.** *(E.)* Rachmilewitz, M. (Hadassah U. Hosp., Jerusalem, Israel) and M. Eliakim. *Israel J. Med. Sci.* 4(1):47-54, 1968.

A microbiological assay of serum vitamin B_{12} levels in 188 patients with various types of hepatobiliary disease revealed values above 500 μμg/ml in all 71 cases of the hepatocellular type of viral hepatitis, 6 of 11 cases of the cholangiolytic type of viral hepatitis, 3 of 7 cases of chlorpromazine jaundice, all 3 cases of phosphorus poisoning, 41 of 56 cases of cirrhosis, 11 of 20 cases of obstructive jaundice due to carcinoma of the pancreas (all 6 with liver metastasis and 5 of 14 without), and 9 of 20 cases of choledocholithiasis (4 of 12 with ascending cholangitis and 5 of 8 without). Particularly high values were observed in the hepatocellular type of viral hepatitis (average 1880 μμg/ml), jaundice due to phosphorus poisoning (average 9800 μμg/ml), cirrhosis of the liver (average 1312-1370 μμg/ml), and pancreatic carcinoma with liver metastasis (average 1433 μμg/ml). Near-normal levels were the rule in the cholangiolytic type of viral hepatitis (average 697 μμg/ml), chlorpromazine jaundice (average 756 μμg/ml), pancreatic cancer without liver metastasis (average 472 μμg/ml), and common duct stones (average 544-552 μμg/ml). The vitamin B_{12} levels generally paralleled the serum glutamic-oxaloacetic transaminase and lactic dehydrogenase levels in hepatitis, but were not directly related to the degree of jaundice. Serum vitamin B_{12} and serum iron levels showed a fairly good correlation in hepatocellular hepatitis but no correlation in cirrhosis. It is noted that the fluctuations in serum iron tend to be less marked, and that serum iron may be normalized in cases of liver damage by extraneous factors such as bleeding. The serum glutamic-oxaloacetic transaminase may be moderately increased in extrahepatic biliary disease, while the serum B_{12} is generally normal. Determination of the serum B_{12} level is particularly useful in non-jaundiced patients and patients with chronic liver disease. On the other hand, it is of no value in differentiating intrahepatic from extrahepatic cholestasis. The serum vitamin B_{12} level is concluded to a sensitive, reliable and specific index of liver cell damage.

1864 **THE ENDOSCOPIC DIAGNOSIS OF HIATUS HERNIA.** *(E.)* Rozen, P. (VA Hosp., Hines, Ill.), D. H. Hanscom and R. C. Fruin. *Israel J. Med. Sci.* 4(1):60-65, 1968.

A hiatus hernia was found in 96 of 332 patients examined by Eder-Bernstein gastroscopy and in 110 of 425 patients examined radiographically over a 12-month period. Small hernias accounted for 82 of the 96 and 95 of the 110. Among this total of 463 patients, 309 were subjected to both procedures. Upper gastrointestinal radiography missed 46 of the 88 hernias detected by gastroscopy in these 309 patients, while gastroscopy missed 42 of the 73 hernias detected by radiography. Approximately 50% of the hiatus hernias detected by either procedure were thus also detected by the other procedure, indicating that these procedures are complementary in the diagnosis of hiatus hernia, especially small hernias. In contrast, use of the esophagoscope or fiberscope was not responsible for the definitive diagnosis of hiatus hernia in a single case, although this procedure occasionally revealed secondary mucosal changes. By way of introduction, it is pointed out that the Eder-Bernstein gastroscope permits direct visualization of the esophagogastric junction and its relation to the cardia; the presence of a hiatus hernia is revealed by the appearance of a pouch lined by gastric mucosa 2-3 cm above the cardia. The endoscopic diagnosis of sliding esophagogastric hiatus hernia has been facilitated by the introduction of this instrument and by detailed anatomical studies of this area of the body.

1865 **RECTAL AND COLONIC MUCOSAL BIOPSY FINDINGS AND FAECES, SIGMOIDOSCOPY, AND HISTOPATHOLOGICAL CORRELATION IN AMOEBIASIS AND OTHER COLITIS.** *(E.)* Madanagopalan, N. (Madras Med. Coll., India), S. P. Vedachalam, R. Subramaniam and R. G. Murugesan. *Gut* 9(1):106-110, 1968.

The results of proctosigmoidoscopy, feces examination, and ectal and colonic mucosal biopsy were compared in 115 paients, including 36 with acute amebic dysentery, 12 with chronic intestinal amebiasis, 9 with hepatic amebiasis, 4 with pleuropulmonary amebiasis, 1 with cutaneous amebiasis, 6 with bacillary dysentery, 9 with ulcerative colitis, 12 with "irritable colon," 16 with abdominal tuberculosis, and 10 miscellaneous (idiopathic hepatomegaly, Hodgkin's disease, hepatoma, multiple myeloma, anal carcinoma, cholelithiasis, Bowen's disease, diabetes mellitus, and duodenal ulcer). Whereas feces examination revealed *E. histolytica* in 35 of 36 cases of acute amebic dysentery, and sigmoidoscopy was positive in 33 of 36, only 17 showed ulceration and/or exudation in the biopsy specimen, 2 showed crypt abscess, and only 5 showed *E. histolytica* in the tissue. Among the other 26 patients with amebiasis, none showed *E. histolytica* in the biopsy specimens, and ulceration or crypt abscess was very rare (ulceration in one patient of each type, crypt abscess in 2 of the 26), even though feces examination revealed *E. histolytica* in 10 of 26 (9 of 12 with intestinal amebiasis) and sigmoidoscopy was positive in 12 of 26 (7 of 12 with intestinal amebiasis). Rectal and colonic biopsy is therefore not recommended as a routine procedure for the differential diagnosis of amebic dysentery. Sigmoidoscopy findings were normal in the 12 patients with irritable colon, the 10 patients with miscellaneous conditions, and 8 of the 16 with abdominal tuberculosis, but in the others there were varying combinations of granularity, hemorrhage, edema and ulceration. Biopsy findings were generally similar and did not contribute to a differential diagnosis. Focal lymphocytic accumulation was seen in 3 of 12 with irritable colon, 5 of 16 with abdominal tuberculosis and 3 of 10 miscellaneous patients (ascariasis and multiple myeloma), as well as in 13 of the patients with amebiasis. It is suggested that lymphocyte accumulation may play a role in the general pathogenesis of colonic ulceration, whatever the basic etiology.

1866 PURIFICATION OF ^{131}I-IODIPAMIDE (RADIOCHOLOGRAFIN) BY PAPER AND GEL FILTRATION CHROMATOGRAPHY. *(E.)* Ostrow, J. D. (Dept. Med., U. Hosp., Cleveland, Ohio) and R. P. Levy. *Gastroenterology* 54(6):1085-1093, 1968.

At least 10 radioactive impurities were demonstrated in 6 lots of Radiocholografin when they were subjected to paper chromatography on Whatman No. 1 paper in a solvent system composed of butanol, ammonium hydroxide, ethanol and distilled water. The principal impurity, confirmed by chromatography on Sephadex G-10 gel, was unbound inorganic ^{131}I, which accounted for 4-31% of the total radioactivity in various lots. Radioactive iodide was found to appear mainly during autoclaving of the partially purified product, while the other labeled impurities developed mainly during the radioiodination process itself. Little further deterioration of Radiocholografin occurred during prolonged storage under laboratory conditions. Purification of Radiocholografin by paper chromatography was effective but unsuitable for large-scale processing since only small amounts can be applied to the paper and since only the middle segment of the iodipamide peak can be utilized because of partial overlap of the iodide peak. Gel filtration was complicated by adsorption of iodipamide to the gels, causing overlap with the iodide peak. On Sephadex G-10 gel, although iodipamide eluted well ahead of the fractions which contained iodide, contaminants other than iodide were not separated from the iodipamide. This type of separation would therefore be acceptable only for experiments in which labeled impurities other than iodide behave similarly to Radiocholografin itself.

1867 MORPHINE IN THE EVALUATION OF GASTROINTESTINAL DISEASE: A CINERADIOGRAPHIC STUDY. *(E.)* Silbiger, M. L. (Clin. Ctr., Natl. Inst. Hlth., Bethesda, Md.) and M. W. Donner. *Radiology* 90(6):1090-1096, 1968.

In 200 patients with sluggish gastric or duodenal peristalsis due to surgically proven disorders of the digestive tract, who were examined cineradiographically before and after administration of morphine (8 mg i.v.), the response of the gastrointestinal tract to this drug was found to be biphasic. Initially, morphine increased gastric tone and the amplitude and frequency of gastric peristalsis in 86% of the patients. The increase began within 2-10 min after injection and lasted for 20-45 min. This hyperactivity extended to the duodenum and jejunum, resulting in prompt filling of the duodenal bulb even in those patients with a significant degree of duodenal spasm before morphine administration. There was no effect on the pylorus. The stimulatory phase was followed by a phase of increasing atony and depression of peristaltic motor function. In the postbulbar duodenum, distension often reached the degree of megaduodenum, and the jejunum showed significant dilatation. Morphine was found to be clinically useful in the X-ray diagnosis of suspected infiltration of the gastric wall (whether by tumor or by ulcer), acute peptic ulceration of the duodenum, adult hypertrophic pyloric stenosis, pancreatic disease, postoperative conditions affecting the stomach or jejunum, and diseases of the gastric antrum. The only contraindications to its use are active intestinal bleeding and hypersensitivity to morphine.

1868 MILK-PRECIPITATING SUBSTANCE IN THE STOOL IN GASTROINTESTINAL MILK SENSITIVITY. *(E.)* Katz, J. (Chelsea Naval Hosp., Mass.), H. M. Spiro and T. Herskovic. *New Eng. J. Med.* 278(22):1191-1194, 1968.

In 4 infants (2-25 months old) with milk-induced gastrointestinal bleeding, protein loss and diarrhea dating from the first few months of life, micro double immunodiffusion studies of the feces revealed substances which precipitated cow's milk (whole or skim) and solutions of alpha-lactalbumin, but not beta-lactoglobulin or casein. No such substances were found in the feces of normal subjects (children or adults) or patients with diarrhea due to ulcerative colitis, regional enteritis, bacterial infection, disaccharidase deficiency, celiac disease or cystic fibrosis. Increased eosinophil counts were found in 3 of the 4 infants, but the precipitating substances disappeared from the stools within 2 days when milk was withdrawn from the diet, accompanied by complete elimination of the symptoms. No precipitins to milk proteins were detected in the sera from these 4 infants, but titers to alpha-lactalbumin were high in 3 of 4. It is suggested that an antigen-antibody reaction is involved in the precipitation of milk protein by fecal substances, which must therefore be looked upon as coproantibodies. It is possible that immunological mechanisms are involved in gastrointestinal milk sensitivity, although the role of antibodies in the pathogenesis of this disorder may only be secondary.

1869 HEPATOGRAPHY WITH OILY CONTRAST MEDIUM INJECTED VIA THE PORTAL VEIN SYSTEM. *(E.)* Lee, Y. T. N. (Sch. Med., U. Missouri, Columbia). *Surgery* 63(6):948-953, 1968.

In experiments on anesthetized mongrel dogs, Ethiodol (0.3-2.0 ml/kg) was injected into the portal vein and the liver was studied by serial hepatography, liver biopsies and liver function tests over periods of up to 3 months. The optimal dose of Ethiodol, yielding a clear hepatogram which lasted for over 2 months, was found to be 0.8-1.0 ml/kg. Liver function tests showed occasional transitory increases in serum glutamic oxaloacetic transaminase and alkaline phosphatase, but these returned to normal levels within 2 weeks after injection. The response was not dose-related. Liver biopsies revealed no evidence of parenchymal damage at any time. Intraportal injection of Ethiodol is concluded to be a relatively safe and effective technique for hepatography.

1870 COMPARISON OF PHENOL RED AND POLYETHYLENEGLYCOL AS NONABSORBABLE MARKERS FOR THE STUDY OF INTESTINAL ABSORPTION IN HUMANS. *(E.)* French, A. B. (U. Michigan Med. Sch., Ann Arbor), I. F. Brown, C. J. Good and G. M. McLeod. *Amer. J. Dig. Dis.* 13(6):558-564, 1968.

The intestinal absorption of phenol red and polyethyleneglycol 4000 was compared by using them simultaneously as marker compounds in perfusion studies of apparent glucose absorption by limited segments of human jejunum. The results of 5 perfusions in 3 subjects with normal intestinal absorption and 3 perfusions in 2 subjects with nontropical sprue, using solutions containing 0.03 mg/ml of phenol red, 10 mg/ml of polyethyleneglycol and 3-108 g/liter of glucose, showed that the behavior of both markers was the same. This was true in both normal subjects and patients with nontropical sprue, and regardless of whether aqueous or saline solutions of glucose were infused. The correlation between glucose absorption values obtained with phenol red or polyethyleneglycol as the marker was 0.97 with glucose in water and 0.99 with glucose in saline. In view of the differences in molecular size and structure between phenol red and polyethyleneglycol, it is safe to assume that neither marker is absorbed to a significant extent under these experimental conditions. This confirms the previous evidence that either phenol red or polyethyleneglycol is a satisfactory "nonabsorbable" marker compound which can be used to indicate dilution in perfusion studies of glucose and electrolyte absorption by limited segments of human intestine.

1871 DIFFERENCES IN COLONIC STAINING WITH TECHNICAL VARIATIONS IN FLUORESCENT ANTIBODY CONJUGATION. *(E.)* Rimplla, J. J. (U. Chicago Sch. Med., Ill.), S. C. Kraft and F. W. Fitch. *Proc. Soc. Exp. Biol. Med.* 126(3):704-708, 1967.

The study of fluorescent antibody conjugation and staining methods in autologous and homologous ulcerative colitis and normal colonic tissues revealed the presence of diffuse nonimmunospecific staining when conjugates were not evenly labeled, had high fluorescein:protein ratios or when final protein concentration was higher than 1.5 mg/ml. While some apparently nonimmunospecific staining of the mucosal epithelial glands was noted, specific fluorescence of these sites could not be detected. Experiments with an evenly labeled stain having a fluorescein:protein ratios of 3.70 x 10^{-3} and a protein concentration of 0.50 or 1.50 mg/ml, revealed specific cytoplasm fluorescence of certain mononuclear cells in ulcerative colitis tissues only. The immunospecificity of this particular staining was established when inhibition occurred following treatment with unlabeled autologous globulin. The source and nature of this apparent antigen were not identified.

1872 DETERMINATION OF HYDROCHLORIC ACID LEVEL IN GASTRIC JUICE BY RADIOLOGICAL METHOD. *(E.)* Szczepanski, J. (Municipal Hosp., Biala Podlaska, Poland). *Pol. Med. J.* 7(1):48-54, 1968.

A new radiological method for the determination of hydrochloric acid by timing fluoroscopically the disintegration in the stomach of a tablet made of barium sulfate coated with an acid-sensitive compound (dimethylaminoethyl ester of polymethacrylic acid) was tested in 798 subjects (563 men and 235 women; 8-77 years old; 585 with various diseases of the alimentary tract). Satisfactory agreement between the method studied and the results obtained by titration was noted in 97% of the cases investigated, when titration was performed on juice samples taken at the time of tablet ingestion; when juice samples were analyzed 15-20 minutes prior to the administration of the tablet, differences ranging between 15 and 30% were noted in 80% of the cases, especially where lower levels of hydrochloric acid were concerned.

1873 EFFICACY OF ROUTINE PANCREATIC SCANNING. *(E.)* Sodee, D. B. (Doctors Hosp., Cleveland, Ohio). *Amer. J. Gastroent.* 48(3):211-215, 1967.

A brief review of the technique of pancreatic scanning by means of selenomethionine-Se^{75} as applied in pancreatitis and pancreas cancer is presented. The best equipment, collination, and technician participation is required to achieve satisfactory clinical results. Since it is given internally and produces total body irradiation, with only 6% going to the pancreas, the amount of radioactive selenomethionine that can be administered is limited.

1874 CLINICAL EVALUATION OF AN INTRADERMAL SKIN TEST FOR AMEBIASIS. *(E.)* Wharton, G. K. (U. Southern California, Los Angeles) and M. Biddle. *Amer. J. Gastroent.* 48(3):233-243, 1967.

Amebic liver abscess antigen induced consistently greater skin reactions in 15 of 16 patients (8 men and 7 women, 5-75 years old) with *E. histolytica* in the stools and in 16 of 17 cases of amebic liver abscess than did the control antigen prepared from normal liver. Amebic liver abscess antigen and normal liver antigen gave approximately the same skin reactions in 11 of 13 patients with nonamebic liver disease (10 with cirrhosis, 2 with infectious hepatitis, 1 with breast cancer and liver metastasis). In all the patients studied, the earliest skin reaction to amebic liver antigen appeared 3 weeks following the onset of diarrhea. Patients who had positive skin test and clinical symptoms responded satisfactorily to antiamebic therapy and showed a reversal of skin response.

1875 A VIRUS-LATEX AGGLUTINATION TEST FOR DETECTING ANTIBODIES AGAINST ISOLATES ASSOCIATED WITH VIRAL HEPATITIS. *(E.)* Bolin, V. S. (Bolin Labs., Glendale, Ariz.), B. S. Chase and J. B. Alsever. *Amer. J. Clin. Path.* 49(5):635-646, 1968.

Blood of 5 volunteers inoculated with NIH Icterogenic Plasma Pool No. 6 contained agents serologically similar to the agent isolated from the liver of a fatal case of infectious hepatitis, suggesting an association of these agents with viral hepatitis etiology. Comparisons are made of volunteer sera antibody titers with those of 113 patients with clinical viral hepatitis. The virus-coated latex agglutination test is described and results of the method show antibody to be demonstrable in nearly 100% of known cases of serum and infectious hepatitis, and in varying percentages of the normal population in different socioeconomic and geographic areas.

1876 RETROGRADE EXAMINATION OF THE SMALL BOWEL FOR DIAGNOSIS OF INTESTINAL OBSTRUCTION. *(E.)* Figiel, L. S. (Dept. Radiol. Wayne State U. Coll. Med., Detroit, Mich.) and S. J. Figiel. *Amer. J. Gastroent.* 48(3):216-223, 1967.

Retrograde investigation of the small bowel during barium enema study was extremely effective for the localization and diagnosis of various obstructive conditions of the terminal small bowel. Retrograde filling of the terminal ileum was possible in approximately 90% of 1000 consecutive enema studies. Five illustrative cases (sex and age data given for only 2 men and 1 woman, 43-76 years old), including 1 volvulus of the terminal ileum, 1 gallstone obstruction, 1 prolapsing tumor, and 2 obstructions of the small bowel, are presented.

1877 PORTAL CATHETERIZATION VIA THE ROUND LIGAMENT OF THE LIVER. *(E.)* Lavoie, P. (St. Luc Hosp., Montreal, Canada), A. Legare and A. Viallet. *Amer. J. Surg.* 114(12):822-830, 1967.

Roentgenographic visualization of the portal venous system was accomplished by umbilicoportography in 120 patients with normal and metastatic livers and in patients with benign and malignant liver diseases. Exact positioning of the catheter tip was emphasized for adequate portograms; the catheter with a metallic probe was guided under image intensification fluoroscopy, thus realizing true splenic, mesenteric, or portal phlebography. Using the technique, research was conducted on the following: the identity of the wedged hepatic vein pressure with free portal pressure in cirrhosis; dosage of hypertensive amines in the portal arterial and venous systemic circulation of patients with and without cirrhosis; hemodynamic changes in cirrhotic livers; and variations of the coagulation mechanisms in splanchnic, suprahepatic, and systemic circulation. Manometric and radiologic applications were made in diagnosis. The technique was applied to treatment in parenteral alimentation, emergency control of esophageal varices hemorrhage, antibiotic administration for liver infections, and infusion chemotherapy for metastatic and primary cancer of the liver.

1878 VASCULAR COMPRESSION OF THE DUODENUM. *(E.)* Mansberger, A. R. (U. Maryland Med. Sch., Baltimore), J. B. Hearn, R. M. Byers, N. Fleisig and R. W. Buxton. *Amer. J. Surg.* 115(1):89-96, 1968.

A case history outline of 12 patients with partial duodenal obstruction secondary to vascular compression is presented. The important mechanical obstructing factors is a combination of a narrow angle of origin with either an abnormally high-positioned but fixed duodenum or an anomalous arterial course directly over the posterior unyielding vertebral bodies and/or aorta to a point by which the duodenum normally transverses one or both of these structures. Diagnosis in all patients was suggested by radiological procedures; cinefluorography was also advantageous in diagnosis. *In vivo* demonstration and measurement of the take-off angles and distances from the aorta to the superior mesenteric artery were made. The number of subjects was small in this study but it is believed that when significant *in vivo* measurements of this type have been accumulated and coupled with duodenal biopsies and complete studies to rule out other causes of duodenal obstruction, much progress will be made toward establishing and accepting vascular compression of the duodenum as a valid cause of partial duodenal obstruction.

1879 ANGIAL RESIDUE HEPATOGRAPHY VERSUS DIRECT TRANSUMBILICAL HEPATOGRAPHY. *(E.)* Piccone, V. A. (VA Hosp. and Downstate Med. Ctr., Brooklyn, New York), J. Ferrante and H. H. LeVeen. *Amer. J. Surg.* 115(1):17-21, 1968.

Angial residue hepatography, using iodized poppyseed oil as a contrast medium allows long-term visualization of the liver which is necessary for hepatic tomography and fluoroscopically controlled liver biopsy. The lipid-soluble material is injected into the umbilical vein, producing a fat embolism which disperses to form a granular opacification which is radiographically apparent after 4 weeks. The lack of intimate detail in angial residue hepatography suggests that very small lesions may not be readily discernible by this method.

1880 DETECTION OF SCHISTOSOME OVA BY DARK FIELD FLUORESCENCE MICROSCOPY. *(E.)* Domingo, M. (VA Hosp., Hines, Ill.), R. F. Mais, R. Weiskopf and S. Fink. *Gastroenterology* 54(5):884-886, 1968.

1881 BILIARY DRAINAGE AND CHOLECYSTOGRAPHY. *(Rev.)(E.)* Tumen, H. J. (U. Pennsylvania Sch. Med., Philadelphia). *Amer. J. Gastroent.* 49(4): 295-297, 1968.

1882 THE PLACE OF MOTILITY STUDIES IN THE MANAGEMENT OF MOTOR DISORDERS OF THE LARGE BOWEL. *(Rev.)(E.)* Truelove, S. C. (Radcliffe Infirm., Oxford, England). *Amer. J. Dig. Dis.* 13(5):484-487, 1968.

1883 DEVICE FOR OBTAINING SAMPLES OF INTESTINAL CONTENTS FOR MICROBIOLOGICAL AND BIOCHEMICAL EXAMINATIONS. *(E.)* Skala, I. (Inst. Human Nutr., Prague, Czechoslovakia) and J. Simáček. *Gut* 9(2):246-248, 1968.

1884 THE HEPATOPARENCHYMAL CLEARANCE OF INDOCYANIN GREEN IN NORMAL SUBJECTS. *(It.)* Proto, C. (Munic. Hosp., Brescia, Italy), G. Grasso and G. F. Levi. *Minerva Med.* 59(6):229-233, 1968.

DIAGNOSTIC PROCEDURES AND GENERAL THERAPY

1885 HEPATIC SCINTILLOGRAPHY. *(Rev.)(E.)* Jones, E. A. *Gut* 8(5):418-420, 1967.

1886 CONSIDERATIONS ON A NEW TEST FOR THE DIFFERENTIAL DIAGNOSIS OF JAUNDICE. *(It.)* Mori, V. (S. Maria Nuova Hosp., Reggio Emilia, Italy) and P. Tognoni. *Minerva Med.* 58(81):3457-3458, 1967.

1887 SELECTIVE EPIPLOOPORTOGRAPHY DURING LAPAROSCOPY. *(Fr.)* Michel, H. (St. Eloi Hosp., Montpellier, France) and L. Bertrand. *Presse Med.* 76(4):175-177, 1968.

1888 A NEW PROCEDURE FOR ESOPHAGOGASTRIC CYTODIAGNOSIS: ASPIRATION BY MEANS OF A "CYTO-RASP" OR RASP– CATHETER (STUDY OF 140 CASES). [ORAL COMMUNICATION; FRENCH NATL. SOC. GASTROENT., JULY 3, 1967] *(Fr.)* Debray, C., P. Housset, C. Marche and J. Garat. *Presse Med.* 75(45):2281, 1967.

1889 SPLENOPORTOGRAPHY WITH IMAGE SUBTRACTION. *(Fr.)* Cacciari, C. (Hotel-Dieu, C. A. Pizzardi, Bologna, Italy), P. Dettori and P. Malaguti. *Presse Med.* 76(4):177-178, 1968.

1890 PANCREATIC SCANNING. *(Rev.)(E.)* Bouchier, I. A. D. *Gut* 8(5):421-422, 1967.

1891 TRANSCUTANEOUS-TRANSHEPATIC CHOLANGIOGRAPHY IN MECHANICAL JAUNDICE DIAGNOSIS. *(Rus.)* Vinogradov, V. V. and F. A. Bragin. *Klin. Med.* 66(2):93-97, 1968.

1892 ASSESSMENT OF THE FUNCTIONAL STATE OF THE LIVER BY RADIOISOTOPE-LABELED ROSE BENGAL. *(Rus.)* Zarkevich, N. F., B. K. Reingardt and A. T. Tsygankov. *Klin. Med.* 66(2):97-99, 1968.

1893 INTRAINTESTINAL ELECTROSTIMULATION AS A METHOD OF TREATING INTESTINAL PARESIS. *(Rus.)* Ageev, A. F., O. S. Kochnev and L. I. Kalinkina. *Klin. Med.* 66(2):114-117, 1968.

1894 EXPERIENCE WITH THE IMMUNOFLUORESCENCE TECHNIQUE IN THE COMPLEX DIAGNOSIS OF EPIDEMIC HEPATITIS. *(Rus.)* Barinskii, I. F. (D. I. Ivanovskii Inst. Virusol. Acad. Med. Sci. USSR, Moscow), B. K. Bezprozvannyi and M. E. Semendiaeva. *Sovet. Med.* (3):30-34, 1968.

1895 DIFFERENTIAL DIAGNOSIS OF CARDIOSPASM AND GASTRIC CANCER IN THE CARDIAL REGION. *(Rus.)* Derezhian, A. (Inst. Specialization and Post. Grad. Med. Study, Sofia, Bulgaria). *Khirurgiia* 44(2):60-63, 1968.

1896 BIOCHEMICAL ANALYSIS OF THE LIVER FUNCTIONS OF TWO HUNDRED SOUTHERN RHODESIAN CHILDREN AND YOUNG ADULTS (PART 1). *(E.)* Sommer, W. G. *Cent. Afr. J. Med.* 14(3):47-55, 1968.

1897 EARLY DIAGNOSIS IN UPPER GASTROINTESTINAL BLEEDING UTILIZING A WATER-SOLUBLE RADIOPAQUE MEDIUM AND ENDOSCOPY. *(E.)* Gabriel, J. B. (Vet. Admin. Hosp., Brooklyn, N. Y.), F. Monaco and J. Dubowy. *Amer. J. Gastroent.* 49(3):255-263, 1968.

1898 INTESTINAL ABSORPTION TESTS FOR USE IN OFFICE PRACTICE. *(E.)* Uyeyama, K. (U. California Sch. Med., San Francisco) and M. R. Loran. *Amer. J. Surg.* 115(6):799-803, 1968.

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1900 RECTAL BIOPSY FOR MEGACOLON. *(E.)* Rowe, M. I. (Ohio State U. Coll. Med., Columbus) and H. W. Clatworthy, Jr. *Surg. Gynec. Obstet.* 126(1):121-124, 1968.

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1902 COMPLICATIONS OF PERITONEOSCOPY. A SURVEY OF 1,455 EXAMINATIONS. *(E.)* Vilardell, F. (Santa Cruz y San Pablo Hosp., Barcelona, Spain), I. Seres and A. Marti-Vicente. *Gastroint. Endosc.* 14(4):178-180, 1968.

1903 TRANSCUTANEOUS-TRANSHEPATIC CHOLANGIOGRAPHY. *(Rus.)* Bragin, F. A. (Fac. Surg. Clin., Patrice Lumumba U., Moscow, USSR). *Khirurgiia* 44(3):68-71, 1968.

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1905 PRINCIPAL INDICATIONS FOR THE USE OF MEDICATIONS DESIGNED TO PROTECT DIGESTIVE MUCOSA. *(Fr.)* Boisson, J. *Vie Med.* 49(4):609-615, 1968.

1906 ASSESSMENT OF TESTS FOR FUNCTIONAL INVESTIGATION OF THE LIVER WITH THE AID OF BENGAL ROSE ^{131}I. *(Rus.)* Mirkhodzhaev, A. Kh. (N. A. Semashko Cent. Clin. Hosp., Moscow, USSR), A. Ia. Arkhipov and V. I. Popov. *Med. Radiol.* 13(2):66-71, 1968.

1907 THE INGUINAL HERNIOGRAM: A RADIOLOGIC AID FOR ACCURATE DIAGNOSIS OF INGUINEAL HERNIA IN INFANTS. *(E.)* White, J. J. (Johns Hopkins Univ. Sch. Med., Baltimore, Md.), L. C. Parks and J. A. Haller, Jr. *Surgery* 63(6):991-998, 1968.

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1909 **RADIOLOGICAL EVALUATION OF METOCHLOPRAMIDE IN GASTROENTEROLOGY.** *(Sp.)* Pitol, A. (Nat. Inst. Nutr., Mexico City), J. Hernandez, A. Carlo and J. J. Villalobos P. *Rev. Inv. Clin.* 19(4):363-367, 1967.

1910 **METHODS FOR STUDYING PREPARATIONS DESIGNED TO PROTECT DIGESTIVE MUCOSA.** *(Fr.)* Duchene-Marullaz, P. (European Res. Ctr., Mauvernay, France) and A. Frandon. *Vie Med.* 49(4):597-606, 1968.

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1912 **METHODS FOR GASTRODUODENAL ASPIRATION.** *(Rus.)* Chernevich, Ie. L. (Novosibirsk Hosp. No. 32, USSR) and I. F. Shumenko. *Lab. Delo.* (3):179, 1968.

1913 **ADAPTIVE GALACTOSE TOLERANCE IN LIVER FUNCTION DIAGNOSIS.** *(Ger.)* Bruckel, K. W. (Munic. Hosp., Stuttgart, Germany). *Med. Welt.* 74(17):1104-1110, 1968.

1914 **MALDIGESTION: CLINICAL EXPERIENCE, DIAGNOSIS, AND DIFFERENTIAL DIAGNOSIS.** *(Ger.)* Ammann, R. (Zürich Med. U., Switzerland). *Praxis* 57(11):365-374, 1968.

1915 **RADIOLOGIC STUDY OF THE NORMAL AND PATHOLOGICAL PREPYLORIC ANTRUM.** *(Fr.)* Vrousos, C. *Franc. Med.* 31(3):133-140, 1968.

1916 **THE LIVER SCINTISCANNER.** *(Fr.)* Soutter, J. *Franc. Med.* 31(3):127-132, 1968.

1917 **THE IMPORTANCE OF SCANNING IN CHRONIC HEPATITIS AND CIRRHOSIS OF THE LIVER.** *(Rus.)* Loginov, A. S. (A. L. Miasnikov Inst. Ther., Leningrad, USSR), O. P. Petrova and A. A. Kramer. *Med. Radiol.* 13(3):54-61, 1968.

1918 **SCINTIGRAPHY IN DIAGNOSIS OF TUMOUR AND CYSTIC LIVER FORMATIONS.** *(Bul.)* Sheiretova, E. (Natl. Med. Inst., Sofia, Bulgaria). *Khirurgiia (Sofia)* 20(6):568-572, 1967.

1919 **IMMUNOELECTROPHORETIC PATTERN OF SERUM PROTEINS IN INFANTS WITH DIARRHOEA.** *(Pol.)* Szczepanski, Z. (Ped. Clin., Acad. Med., Zabrez, Poland). *Pol. Tyg. Lek.* 23(22):821-823, 1968.

1920 **INTEGRAL DOSE IN 35-MM CINEFLUOROGRAPHY OF THE GASTROINTESTINAL TRACT.** *(E.)* Kaude, J. (Lund U. Hosp., Sweden). *Acta Radiol.* 7(2):170-176, 1968.

1921 **ON THE X-RAY DIAGNOSIS OF BILIODIGESTIVE COMMUNICATIONS.** *(Ger.)* Prager, W. (Radiol. Clinic, Karl Marx U., Leipzig, Germany). *Radiol. Diagn.* 9(1):31-40, 1968.

See also abstract nos.: 2121,2122,2382,2394,2472,2605

GASTROINTESTINAL DISEASES

GENERAL

1922 STUDIES ON *YERSINIA ENTEROCOLITICA:* OCCURRENCE IN VARIOUS GROUPS OF ACUTE ABDOMINAL DISEASE. *(E.)* Niléhn, B. (Gen. Hosp., U. Lund, Malmö, Sweden) and B. Sjöström. *Acta Path. Microbiol. Scand.* 71(4):612-628, 1967.

Microbiological studies of samples of appendiceal tissue, feces and/or lymph nodes yielded positive cultures of *Yersinia enterocolitica* in 22 of 581 patients who had undergone appendectomy and in 16 of 284 patients who were not operated on but had been admitted for symptoms resembling acute appendicitis, as well as in 1 of 974 controls (283 women operated on for gynecological disorders, 104 children hospitalized for trauma and 587 healthy subjects). The positive control patient was a woman with an ovarian cyst and an apparently normal appendix which nevertheless yielded a positive culture. The positive cultures from appendectomy patients included 8 of 10 with terminal ileitis, 9 of 69 with mesenteric lymphadenitis, 3 of 93 with no demonstrable lesion at operation, and 2 of 337 with acute inflammation of the appendix; the culture of the appendix itself was positive in 21 cases, while in one case only the feces were positive. The patients included 13 males and 9 females, 4-58 yr old, and there was no significant seasonal variation in incidence. All patients with positive cultures developed agglutinins against the O-antigen prepared from the bacterium, usually in high titers. It is assumed that the organism enters the body by way of the gastrointestinal tract, but this question remains obscure. It is suggested that *Yersina enterocolitica* is of pathological significance in acute terminal ileitis and possibly in mesenteric lymphadenitis.

1923 FUNCTIONAL AND STRUCTURAL CHANGES IN THE SMALL INTESTINE IN CHILDREN WITH HOOKWORM INFECTION. *(E.)* Guha, D. K. (Victoria Zanana Hosp., Jama Masjid, Delhi, India), B. N. S. Walia, B. N. Tandon and O. P. Ghai. *Arch. Dis. Child.* 43(228):235-238, 1968.

Among 14 children (9 boys and 5 girls, 4-12 yr old) with hookworm infection and associated microcytic hypochromic anemia, 8 showed increased fecal fat excretion and 7 showed poor xylose absorption. Mild histopathological changes (blunting and fusion of villi and increased cellular infiltration in the lamina propria) were found in the jejunal mucosa of 3 children and moderate changes (villous atrophy, villous fusion and blunting, increase goblet cells) were seen in 2. All of the findings were normalized 8-24 weeks after treatment with i.m. iron-dextran complex and bephenium (5 g single dose) in the 12 children studied again, even though 2 of the 12 still harbored hookworms. The pathogenesis of the mucosal abnormalities remains unclear, but it seems likely that they are responsible for the malabsorption associated with hookworm infestation.

1924 MUCOSAL MORPHOLOGY AND ACID SECRETORY CAPACITY OF THE STOMACH IN HOOKWORM ANEMIA. *(E.)* Goyal, R. K. (Yale U. Sch. Med., New Haven, Conn.), S. K. Puri and H. K. Chuttani. *Gastroenterology* 54(5):922-928, 1968.

Gastric biopsy (Crosby-Kugler capsule) and the maximal histamine test for gastric secretory function were carried out before and after treatment in 40 adult males (mean age 27 yr) with hookworm infestation and associated severe anemia (hemoglobin 2-7.6 g%, mean 4.66), mostly of less than one year duration. The results were compared with those in 22 healthy controls and 10 patients with anemia (mean hemoglobin 5.08 g%) due to bleeding hemorrhoids in the absence of intestinal parasites. The frequency and severity of gastritis were no different in patients with anemia (of whatever the cause) than in healthy controls, a normal mucosa being observed in 26 of 40, 15 of 22 and 6 of 10, resp. There were no cases of gastric atrophy. The mean maximal acid output was 8.05 mEq/hr in patients with hookworm and 7.44 mEq/hr in those with hemorrhoids, compared to 14.77 mEq/hr in healthy controls. There was no correlation between ova load and the incidence of gastritis, nor between the severity of anemia and either the incidence of gastritis or the maximal acid output. There was a good correlation, however, between gastritis and decreased acid secretion in both healthy subjects and patients with anemia. Thus, the mean maximal acid output (mEq/hr) in healthy controls was 16.57 in the presence of a normal gastric mucosa, 12.68 in those with superficial gastritis and 6.45 in those with atrophic gastritis, while the corresponding values were 9.58, 7.09 and 2.74 mEq/hr in patients with hookworm. Treatment with either thiabendazole (50 mg/kg/day x 3) or hematinic drugs had no effect on the gastric mucosa, but increased the maximal acid output in 7 of 8 and 8 of 9 cases, resp. It is concluded that hookworm infestation *per se* has no effect on the gastric mucosa or the acid secretory capacity; anemia, however, seems to impair the secretory capacity of the stomach without producing detectable morphological alterations in the mucosa.

1925 RHEUMATOLOGY AND THE GASTROINTESTINAL TRACT. *(E.)* Palmer, W. L. (1320 East 58th Street, Chicago, Ill.). *J. Amer. Geriat. Soc.* 16(5):505-513, 1968.

A careful analysis of the literature (11 refs.) reveals an incidenc of peptic ulcer varying from 2 to 44% in patients with arthritis. Although many workers have reported an association between peptic ulcers and steroid therapy, as well as between an increasing incidence of peptic ulcer and duration of arthritis, others have observed a consistent peptic ulcer incidence of abou 10% regardless of steroid therapy and suggest that other factors may be responsible for the general increase in peptic ulcer incidence over the past decades. Studies of the age incidence of peptic ulcer reveal a sharp peak around 40-50 yr and a rapidly rising age-specific death rate. It is also of interest that the male:female predominance in peptic ulcer decreases markedly after the female menopause. Experimental studies have shown that gastrin, histamine, insulin, testosterone, aspirin, phenylbutazone, cinchophen and Rauwolfia are all ulcerogenic, with more doubt being expressed about caffeine, alcohol, corticosteroids and the use of tobacco. It is concluded that th pathogenesis of peptic ulcer depends on a balance between digestive secretions and mucosal resistance in the stomach and duodenum. Patients with rheumatic disease seem to be particularly prone to ulcer, and it should not be assumed that the drugs used to treat the rheumatic diseases are directly responsible. Mention is also made of the association between scleroderma and loss of esophageal motility, as well as that between chronic ulcerative colitis and complications such as erythema nodosum, pyoderma gangrenosum, spondylitis and rheumatoid arthritis. Arthritis, for example, seems to be associated with both ulcerative colitis and regional enteritis, and association between flares of arthritis and exacerbations of colitis has been reported in 60-88% of ulcerative colitis patients with peripheral arthritis and 14-26% of those with spondylitis. Among 240 personal cases of ulcerative colitis treated with steroids, only 2 developed peptic ulcers, and there were no recurrences among 9 patients with a history of peptic ulcer. It is therefore felt that the considerable benefits of steroid therapy should not be forgotten as a result of undue fear of their ulcerogenic properties.

1926 EXTRAHEPATIC PORTAL HYPERTENSION: THE CLINICAL EVALUATION, INVESTIGATION AND RESULTS OF TREATMENT OF 28 PATIENTS. *(E.)* Stathers, G. M. (Dept. Med., U. Sydney, Australia), M. H. Ma and C. R. B. Blackburn. *Aust. Ann. Med.* 17(1):12-19, 1968.

Among 28 patients (11 males and 17 females, 3 months to 18 yr of age) with the syndrome of portal hypertension, bleeding from esophageal varices, extrahepatic obstruction of the portal vein and a normal liver, 8 had a definite history of severe infection (umbilical sepsis, osteomyelitis and lower-limb abscesses), 3 had had neonatal jaundice and 3 others had had possible early infections. All but one patient had gastrointestinal bleeding, although in 10 the presenting symptom was splenomegaly, lethargy, fever, abdominal pain and distension, epistaxis, vomiting and diarrhea, or jaundice. Splenomegaly was present in all 28, hepatomegaly in only one, and 17 of 21 patients studied showed evidence of hypersplenism. Transitory ascites occurred in 4 cases, but liver function tests were generally normal. The liver biopsy was normal in 10 of 21 cases, while 9 showed inflammatory infiltration of the portal tracts, associated in 3 cases with mild fibrosis. Bleeding may have been precipitated by salicylates in 10 cases, by bones in the diet in 4, by pregnancy in 5 and by fever in 3 cases. Barium-meal studies revealed esophageal varices in all cases, plus probable gastric varices in 6 and duodenal varices in 2. Among 11 patients subjected to splenoportography, 10 showed extrahepatic obstruction of the portal vein and 3 had formed spontaneous portacaval venous shunts. In 5 other patients, obstruction and cavernous transformation of the portal vein were demonstrated by splanchnic venography. Among the 6 children who were treated entirely by conservative methods (diet, exclusion of salicylates, highly seasoned foods and alcohol, plus blood transfusions and measures to control bleeding when needed), one died, 4 recovered, and one continued to bleed frequently. Emergency surgery (esophagogastrectomy) to control bleeding was generally only temporarily successful. Among the 22 patients given definite operations (splenectomy in 12 and splenorenal venovenous anastomosis in 10), 20 recovered (in 10 cases only after additional surgery) and 2 died. Other operations required to stop bleeding in 7 of 10 survivors after splenectomy and 3 of 10 after splenorenal anastomosis include partial gastrectomy and partial esophagectomy, ligation or injection of varices, omentopexy, subtotal gastrectomy, and high gastric transection with pyloroplasty. Although the results of surgery were favorable, especially those of splenorenal anastomosis, it is emphasized that conservative nonoperative management should be tried first whenever feasible, particularly in young children.

1927 INTRAMURAL INTESTINAL HEMORRHAGE AND ENTEROCOLONIC VASCULAR OCCLUSION: A REVIEW. *(E.)* Costopoulos, L. B. (U. Alberta Hosp., Edmonton, Canada), J. E. Anselmo, H. T. Debas and R. C. Harrison. *Canad. J. Surg.* 11(2):188-198, 1968.

The diagnosis and management of disturbances in the mesentery circulation are discussed on the basis of the literature (18 refs.) and 10 illustrative cases: 4 (men, 18-75 yr old) with bleeding into the bowel wall due to trauma and 6 (men, 61-89 yr old) with "enterocolonic vascular occlusion," a term which is proposed to cover circulatory disorders such as superior- and inferior mesenteric artery occlusion due to thrombosis or embolism, occlusion of more peripheral mesenteric arteries, usually due to emboli of atheromatous origin, and interference with bowel function due to inadequate perfusion in the absence of organic arterial obstruction. In both types, there is abdominal pain and evidence of partial or complete gastrointestinal obstruction, with varying degrees of abdominal tenderness. The clinical picture is related to the degree of dysfunction that follows vascular insufficiency, and ranges from lack of peristalsis through mucosal ulceration (which may either cause bleeding or heal with stenosis) to gangrene with perforation and resultant peritonitis. The radiological examination is very useful in the identification and follow-up of these conditions. Management depends on the severity of the lesion. In the absence of peritonitis, conservative treatment is often possible, with emphasis on improving the blood flow in the bowel. If laparotomy is performed and reveals intramural hemorrhage with a viable intestine, then resection is still not indicated. If pulsations are absent at the origin of the mesenteric arteries, embolectomy or thromboendartrectomy should be attempted. If the colon appears viable but functionally obstructed, a proximal colostomy is sufficient, but a gangrenous bowel must be resected completely. If a small-bowel resection and anastomosis have been carried out using questionably viable bowel, reoperation after 24 hr is indicated. Antibiotics should be given, but anticoagulants and corticosteroids are contraindicated.

1928 GASTROINTESTINAL MANIFESTATIONS OF MALIGNANT LYMPHOMA. *(E.)* Ehrlich, A. N. (Mem. Sloan-Kettering Cancer Ctr., New York City), G. Stalder, W. Geller and P. Sherlock. *Gastroenterology* 54(6): 1115-1121, 1968.

Among 323 patients with lymphoma (125 cases of reticulum cell sarcoma, 123 of Hodgkin's disease and 75 of lymphosarcoma) who came to autopsy at the Memorial and James Ewing Hospitals during the period 1960-64, 203 had pathological changes in the gastrointestinal tract (exclusive of liver and spleen); this included 157 patients with direct involvement of the gastrointestinal tract by tumor (200 malignant lesions, including 123 from reticulum cell sarcoma, 46 from lymphosarcoma, and 31 from Hodgkin's disease) and 46 patients with 139 benign lesions (erosion, ulceration, infections, and side effects of treatment) of the gastrointestinal tract in the absence of metastasis (39 lesions in patients with reticulum cell sarcoma, 45 in patients with lymphosarcoma, and 55 in patients with Hodgkin's disease). The clinical course and autopsy findings in this group of patients are evaluated in detail. Gastrointestinal involvement was most common in reticulum cell sarcoma (82%), the organs most often involved being the pancreas, stomach and serosa (34-43%), followed by the biliary tract (26%), the esophagus (24%), and the small intestine. Lymphosarcoma involved the gastrointestinal tract in 57% of the cases, the organs most often involved being the stomach (48%), followed by the pancreas, jejunum and esophagus (20-23%), and then the serosa and other segments of the intestine; only 1% showed biliary tract involvement. Hodgkin's disease involved the gastrointestinal tract in 48%, the organs most often involved being the stomach and esophagus (23-25%), followed by the pancreas and serosa (7-12%) and then the intestines and biliary tract. There were 71 esophageal lesions (47 benign and 24 malignant, 15 of the 24 tumors being reticulum cell sarcoma), 128 gastric lesions (51 benign and 77 malignant, including 39 reticulum cell sarcomas), 28 duodenal lesions (14 benign and 14 malignant, including 10 reticulum cell sarcomas), 44 jejunal lesions (10 benign and 34 malignant, including 22 reticulum cell sarcomas), 32 ileal lesions (4 benign and 28 malignant, including 23 reticulum cell sarcomas), 36 lesions of the colon (13 benign and 23 malignant, including 14 reticulum cell sarcomas), 27 cases of gallbladder invasion (22 by reticulum cell sarcoma), 13 with invasion of the common bile duct (11 by reticulum cell sarcoma), 86 pancreatic tumors (including 53 reticulum cell sarcomas), and 61 malignant invasions of the serosa. Bleeding was noted in 73 cases (66 with upper gastrointestinal bleeding) and was most often of nontumor origin, particularly when the stomach was free of malignant involvement. Thus, bleeding was due to benign lesions of the esophagus, stomach and duodenum in 14, 28, and 5 cases, resp., compared to one case of esophageal malignancy and 18 gastric tumors which were responsible for bleeding. Perforation, however, was more commonly due to the tumor itself (16 cases, including 12 from reticulum cell sarcoma) than to the side effects of therapy (5 cases). Gastrointestinal obstruction was found in 20 cases, including 12 with obstruction of the ileum or jejunum, and all 20 were due to reticulum cell sarcoma; 5 of the 12, however, were young patients (3-31 yr old) with ileocecal intussusception. Diarrhea was a leading symptom in only 12 cases, and obstructive jaundice was noted in 14 (6 with common duct invasion by reticulum cell sarcoma, 4 with compression of the biliary tree, and 4 with tumors of the head of the pancreas). The prognosis of malignant lymphoma was significantly affected by involvement of the gastrointestinal tract. Thus, whereas the overall survival averaged 24, 33 and 59 months, resp., in reticulum cell sarcoma, lymphosarcoma and Hodgkin's disease, this was markedly reduced in patients with bleeding, gastrointestinal obstruction or perforation (to 1-3 months), moderately reduced by the presence of vomiting and dysphagia (to 2-14 months), and somewhat affected even by the mere finding of abdominal pain or masses (5-28 months).

1929 HEREDITARY HEMORRHAGIC TELANGIECTASIA: AN ANGIOGRAPHIC STUDY OF ABDOMINAL VISCERAL ANGIODYSPLASIAS ASSOCIATED WITH GASTROINTESTINAL HEMORRHAGE. *(E.)*

Halpern, M. (U. South. California Sch. Med., Los Angeles), A. F. Turner and B. P. Citron. *Radiology* 90(6):1143-1149, 1968.

Hereditary hemorrhagic telangiectasia is an inherited, diffuse, pleomorphic angiodysplasia in which significant vascular abnormalities of the abdominal viscera are demonstrable by visceral angiography. These abnormalities can be divided into three types: aneurysms, arteriovenous communications, and angiomas. The most common clinical symptom is epistaxis, and the incidence of gastrointestinal hemorrhage is significant. The vascular abnormalities and hemodynamic alterations found in 11 cases (6 males and 5 females; 2 children, 7-12 yr of age, and 9 adults, 33-68 yr old) of hereditary hemorrhagic telangiectasia, 8 of whom had cutaneous lesions and 7 of whom had gastrointestinal bleeding, are described in detail. These included gastric angioma (8 cases), intestinal phlebectasia (3 cases), arteriovenous fistulas (3 cases), capillary angiodysplasia of the liver (5 cases) or pancreas (1 case), hepatic angioma (1 case), conglomerate masses of angiectasia in the colon (2 cases), and aneurysm of the hepatic or splenic artery (1 case each); one of the 11 patients had no detectable vascular abnormalities despite epistaxis. It is pointed out that the primary vascular lesion involves capillary and venous channels with thin, delicate vessel walls which rupture in response to minimal trauma. The walls consist of a single layer of endothelial cells supported by a fine layer of connective tissue and lacking an elastic lamina. Typical telangiectasia may be found on the surface of the abdominal organs as well as in the gastrointestinal mucosa. The lesions predominate in the submucosa but may extend into the muscularis externa and also appear as phlebectasia on the serosal surface of the organ. Thrombosis is frequent and hepatic enlargement is not uncommon. Portal fibrosis is seen together with an ischemic type of liver atrophy that shows evidence of both atrophy and regeneration. Bile duct ectasia, dilatation of the hepatic and portal veins, and angiomata are also seen. The importance of selective celiac and superior mesenteric arteriography in the differential diagnosis of these conditions is emphasized. This technique may not reveal the precise site of gastrointestinal bleeding, but it does provide a diagnosis and an assessment of the extent of the intra-abdominal vascular dysplasias.

1930 BUDD-CHIARI SYNDROME WITH OBSTRUCTION OF THE INFERIOR VENA CAVA. *(E.)*

Yamamoto, S. (Nagoya U. Sch. Med., Japan), Y. Yokoyama, K. Takeshige and S. Iwatsuki. *Gastroenterology* 54(6):1070-1084, 1968.

The pathogenesis, diagnosis and treatment of the Budd-Chiari syndrome are discussed on the basis of 19 cases (10 men and 9 women, 25-56 yr old) of extrahepatic hepatic vein obstruction encountered among 390 patients with portal hypertension seen in the Hepatic Service during the period 1951-67. All 19 had obstruction of the inferior vena cava, and 13 of the 19 came to surgery. A 1-15 yr history of edema, with or without varicose veins (in 2 cases) and excessive pigmentation, was reported by 16 patients, and 17 had had superficial collaterals in the trunk for 1-13 yr. Most had marked-to-moderate ascites, jaundice (in 8 cases), and hepatosplenomegaly, and 6 of the 19 had a history of hematemesis and melena. All but one (who had definite vena caval obstruction but no signs of portal hypertension) had esophageal varices, and 2 patients had a history of portasystemic encephalopathy. The pressure in the inferior vena cava was 270-500 mm saline in the 18 cases with portal hypertension, while that in the portal vein was 220-500 mm saline in 11 of these (not measured in the others). Of the 2 cases with incomplete membranes, one survived for 5 yr on medical treatment and one died of uremia 1 month after omentonephropexy and splenectomy. Among the 8 cases with thin membranes and slight to moderate stricture, one survived for 5 yr on medical treatment, one died of pneumonia 2 months after proximal gastrectomy and splenectomy, 3 died during or after omentosternopexy (one of massive esophageal hemorrhage and one of cholangiocarcinoma), one died of hepatic insufficiency 7 months after treatment by the modified ilial strip method, one improved and survived for 5 yr after the same type of treatment, and one improved after transcardiac membranotomy but obstruction recurred 6 months later. Among the 9 cases with thick membranes and severe stricture, 4 were given medical treatment (2 of 4 died of hepatocellular carcinoma and 2 survived for 1-5 yr), 2 were treated by omentosternopexy and splenectomy (one died of hepatic insufficiency in 1 week and one was improved for at least 3 months), one improved for 5 months after azygocaval anastomosis, and in 2 cases patency was reestablished by a short bypass or patching with Teflon grafts. The one case without portal hypertension and 4 cases treated by direct surgical excision of the vena caval obstruction (transcardiac membranotomy, azygocaval anastomosis, bypassing with Teflon graft, and patching with Teflon mesh, resp.) are reported in detail. On the basis of the anatomical findings in these cases, it is concluded that a congenital anomaly related to closure of the ductus venosus is an important factor in the pathogenesis of this condition, which must be distinguished from the original Budd-Chiari syndrome without obstruction of the vena cava. The diagnosis of this new syndrome can best be confirmed by catheterization of the vena cava. Treatment should be directed primarily at the control of fatal hemorrhage from esophageal varices, but repair of the inferior vena cava is essential for long-term success.

1931 **FATAL GASTROINTESTINAL HEMORRHAGE, CLINICALLY UNRECOGNIZED.** *(E.)* Lowe, W. C. (VA Hosp., East Orange, N. J.) and E. D. Palmer. *Amer. J. Gastroent.* 49(5):405-408, 1968.

Seven cases are reported in which the patients (6 men and 1 woman, 49-95 yr old) exsanguinated into the gastrointestinal tract without external show of blood and without signs such as vomiting or bloody stools. The origin of the bleeding was found at autopsy to be gastric ulcers in 3 cases, gastritis in one, duodenal ulcer in one, and esophageal varices in one; in the 7th case no responsible bleeding point could be found (cancer of the prostate and biliary tract). None of these hemorrhages was recognized during life, even though a digital rectal examination may be all that is needed to recognize bleeding in many such cases (once the blood has reached the colon). In aged, debilitated patients, the presence of blood in the gastrointestinal tract may not provoke increased motility, and repeated determinations of hematocrit and hemoglobin are not helpful due to the rapidity of death from gastrointestinal hemorrhage. Control of blood pressure and pulse rate is urged.

1932 **EXCRETION OF 5-HYDROXYINDOLEACETIC ACID IN PATIENTS WITH DUODENAL ULCER AND SPASTIC COLITIS AFTER ADMINISTRATION OF CERTAIN ANTICHOLINERGIC DRUGS.** *(E.)* Pokora, J. (Med. Acad. in Lublin), A. R. Tuszkiewicz, J. Czarnecki and M. Matuszewski. *Polish Med. J.* 7(1):61-65, 1968.

The urinary excretion of 5-hydroxyindoleacetic acid (5 HIAA) was determined in 12 duodenal ulcer and 10 spastic colitis patients for 3 days before, during, and after the administration of atropine, Antrenyl, and Ambutonium for a total of 21 days (3 days for each drug and 3 day intervals between the drugs). In duodenal ulcer cases a marked increase in urinary 5-HIAA was noted. The results suggest that the effect of the anticholinergic drugs on the serotonin metabolism observed in cases of duodenal and gastric ulcer cannot be explained merely by the influence of these drugs on the cholinergic system. This effect was not observed in spastic colitis.

1933 **GASTRIC AND PANCREATIC SECRETIONS IN PELLEGRA IN EGYPTIAN CHILDREN.** *(E.)* Hanafy, M. M. (Faculty Med., U. Alexandria, Egypt), A. A. Konbar, M. M. Zeitoun and A. I. Hassen. *J. Tropical Med. & Hyg.* 71(5):125-129, 1968.

A biochemical study of gastric and pancreatic secretions was carried out on 20 normal, and 35 pellagric children. Secretin injection stimulated an increased volume, bicarbonate content, and total enzyme output of pancreatic secretion within 60 min in both normal and pellagric children. The concentration of trypsin, amylase, and lipase per ml of duodenal content decreased after secretin injection and reached a maximum decrease during the third 10 min, then gradually increased to fasting levels after 60 min. The diminution in enzyme secretion was proportional to the clinical severity of pellegra and returned to normal with treatment and the disappearance of the clinical manifestations.

1934 **ESOPHAGEAL VARICES IN THE ABSENCE OF CIRRHOSIS. INCIDENCE AND CHARACTERISTICS IN CONGESTIVE HEART FAILURE AND NEOPLASM OF THE LIVER.** *(E.)* Luna, A. (Hektoen Inst. Med. Res., Chicago, Ill.), H. P. Meister and P. B. Szanto. *Amer. J. Clin. Path.* 49(5):710-717, 1968.

Esophagi of 46 autopsy cases with extensive tumor infiltration of the liver and 74 autopsy cases of congestive heart failure were studied using a modified Chomet's technique (tissue was fixed with Kayserling solution No. 1, and H-E, PAS, and elastic stains were used). Varices were measured under microscope and criteria of definition were grossly tortuous veins with well developed vascular coats showing fibrosis and a minimal vein diameter of 2.6 mm. Varices were found in 6.7% of congestive heart failure cases, with only 1 case showing bleeding, and in 12.5% of the cases with metastases to the liver, with 2 cases showing bleeding. In the cases of primary liver carcinoma, 75% had varices and 1 case showed bleeding.

1935 **INJURIOUS EFFECT OF PANCREATIC SECRETIONS ON POSTRADIATION ENTEROPATHY.** *(E.)* Morgenstern, L. (Cedars-Sinai Med. Ctr., Los Angeles, Calif.) and N. Hiatt. *Gastroenterology* 53(6):923-929, 1967.

In order to differentiate which of the components of the intestinal content is responsible for the severe mucosal changes seen after acute radiation injury of the small intestine, 10 dogs (15-20 kg) were prepared with a Roux-en-Y cholecystojejunostomy and Thiry-Vella fistula. Gross and microscopic changes seen in the mucosa after exposure to the following components were studied: 1) contact of small intestine with pancreatic secretion and its own intrinsic secretion, 2) pancreatic juice, bile, and intrinsic secretion, 3) bile and intrinsic secretion, and 4) its own intrinsic secretion alone. A component of pancreatic juice, as yet unidentified, has been implicated as the injurious factor; trypsin is suggested. If methods can be devised to divert or neutralize this component, the enteropathy resulting from large doses of radiation may be diminished.

1936 **TRENDS IN SURVIVAL OF DIGESTIVE SYSTEM CANCER PATIENTS IN CONNECTICUT, 1935 TO 1962.** *(E.)* Eisenberg, H. (Dept. Med., Hartford Hosp., Conn.), P. D. Sullivan and F. M. Foote. *Gastroenterology* 53(4):528-546, 1967.

This report is based on 35,851 patients with cancer of the stomach, large intestine, rectum including rectosigmoid, esophagus, pancreas, liver, and gallbladder admitted to Connecticut hospitals from 1935 through 1962. These sites accounted for 98% of total digestive system cancer in this period. The rates are shown by sex, stage of disease, age, and calendar period of diagnosis for treated and untreated patients combined and for those treated by surgery only in the first course. All rates were adjusted for normal mortality from other causes. Cases unconfirmed microscopically are included with confirmed cases. The following 5-year survival rates obtain resp., for men and women for the period 1955 to 1959: 1) stomach: overall 12.2% and 16.0%, with surgical treatment 24.5% and 29.4%; 2) large intestine: overall 38.4% and 44.8%, with surgical treatment 47.4% and 54.8%; 3) rectum: overall 36.1% and 38.1%, with surgical treatment 48.7% and 48.9%. Comparative data are presented showing improvement in survival rates for the 1955-1959 period *vs.* 1935-1955. Survival at 5 years did not reach 8% in any period of diagnosis for cancers of the liver, gallbladder and ducts, pancreas, and male esophagus. The 5-year rate exceeded 10%, however, among women with esophageal cancer in 1950-1959.

1937 **EFFECT OF SALICYLATES ON GASTROINTESTINAL PROTEIN LOSS IN NORMAL SUBJECTS.** *(E.)* Beeken, W. L. (U. Vermont Coll. Med., Burlington). *Gastroenterology* 53(6):894-899, 1967.

Gastrointestinal clearance of ^{51}Cr-albumin was measured in 5 groups of 10 subjects each before and during ingestion of 5 commonly used salicylate compounds. The 5 compounds were 1) acetylsalicylic acid (contained in all 5 compounds), 2) aluminum glycinate and magnesium carbonate, 3) acetophenetidin and caffeine, 4) compounds No. 3 above and salicylamide, and 5) compound No. 4 above, citric acid, and KCl. In 4 of the 5 groups tested, mean albumin and equivalent serum losses increased significantly during salicylate ingestion by factors of 1.75 to 2.20 and 1.76 to 2.36, resp. These losses are proportionately less than salicylate-induced erythrocyte losses. Although these protein losses can usually be compensated for by normal subjects, patients with altered catabolic and synthetic mechanisms may develop hypoproteinemia.

1938 **TRENDS IN THE TREATMENT OF ACUTE DIARRHOEAS IN INFANCY.** *(E.)* Udani, P. M. (Grant Med. Coll., Bombay, India), P. M. Shah, S. Mukerji, R. S. Panvalkar, M. M. Kumbhat, R. R. Sanzgiri, C. M. Jain, M. R. Sameul and S. N. Deshpande. *Indian Pediat.* 5(1):1-16, 1968.

Results of diet, fluid, electrolyte, and drug therapy in acute diarrheal disease in infants in a recent series of 100 consecutive cases in India are compared with morbidity and mortality data for 1960-64. Data are presented on the following topics: 1) incidence of acute gastroenteritis 1960-64 (2835 cases); 2) age incidence in the 2835 cases; 3) mortality in gastroenteritis (440 of the 2835 cases, 4 in the 100-case series); 3) deaths in different age groups in the 2835 series; 4) bacteriological and virological considerations of 642 cases in 4 Indian medical centers (Vizagapatam, Vellore, Delhi, and Bombay); 5) incidence of single and mixed infections with viruses and pathogenic bacteria; 6) incidence of types of virus; 7) incidence of Enteroviruses in different months of the year; 8) sensitivity tests of *E. coli* (type specific), *Shigella, Proteus, Paracolon,* and *Pyocyaneous* to various antibiotics; 9) lesions in 108 cases studied at autopsy (including pulmonary complication incidence 58.5%); 10) incidence of associated infections in the 2835 series (respiratory 21%, tuberculosis 5%, skin 3%, and parasitic infestations 4%); 11) electrolyte studies; sodium, incidence of hyponatremic dehydration, incidence of varying types of dehydration in different nutrition groups (33-62%), range of serum potassium, serum CO_2 levels, blood urea, and serum chlorides; 12) results of fluid therapy as assessed by increase in weight after hydration in 48 cases; 13) nutrition status and handicaps; 14) therapy: fluid and electrolyte (sodium, potassium, magnesium, and alkalies), diet, and drug.

1939 **STATE OF INTERNAL SECRETION OF PANCREAS IN PELLAGRA IN CHILDREN.** *(E.)* Zeitoun, M. M. (Dept. Pediat., U. Alexandria, Egypt), S. El-Khateeb, M. M. Hanafy and A. M. Konbar. *J. Trop. Med. Hyg.* 71(5):129-130, 1968.

The effect of pellagra on the endocrine secretion of the pancreas was studied in 15 pellagric children and 10 normal controls, by oral glucose tolerance determinations. Data were collected for fasting blood sugar levels and increased levels, after administration of glucose test dose, at 1/2, 1, 1 1/2, and 2-hr levels. No significant difference was observed in the glucose tolerance curves of the 2 groups.

1940 **NATURAL HISTORY OF GARDNER'S SYNDROME.** *(E.)* Thomas, K. E. (West Virginia U. Med. Ctr., Morgantown), A. L. Watne, J. G. Johnson, E. Roth and B. Zimmermann. *Amer. J. Surg.* 11(2):218-226, 1968.

The familial aspects of Gardner's syndrome were investigated in 10 patients (ages 11-46 yr) from 2 unrelated families; the case history of each is given. The diagnosis of Gardner's syndrome should be considered only when osteomas, soft tissue tumors and colonic polyposis (with or without a positive family history) are present or when one or more of the triad are present in a patient in whose family there are members with the complete triad. It has been demonstrated that colonic polyposis may not be inevitable in a member of a family with the syndrome possessing an external manifestation; if there are no external manifestations, polyposis may be present. Radiological studies of the long bones, digits, mandible, and skull are important in the establishment of Gardner's syndrome. With respect to age of onset, propensity for regression after ileoproctostomy, and age of death, the biological behavior of Gardner's syndrome and familial polyposis are identical; however, the gene transmitting the two diseases are probably dissimilar. Partial colectomy with low ileorectal anastomosis is the preferred treatment in Gardner's syndrome.

1941 **HOW CAN THE OUTLOOK IN ALIMENTARY TRACT CANCER BE IMPROVED?** *(E.)* Wangensteen, O. H. (U. Minnesota Med. Sch., Minneapolis) and H. Sosin. *Amer. J. Surg.* 115(1):7-16, 1968.

In the last decade, there has been a decreased incidence of gastric cancer; this is particularly noted in Japan where the regular use of air contrast radiology, gastroscopy, and the gastric camera can detect cancer while it is still limited to the mucosa and submucosa. The prevalence of gastric cancer may be diminishing because of lesser ingestion of dietary carcinogens. Despite the improved outlook, the striking change for the better in survival rates has not materialized. The second look operation has been invaluable in detecting residual cancer after what was thought to be a complete operation; the surgical excision of all lymph tissue with curative resection is advocated. Near total or total colectomy should be given wider acceptance in good surgical risk patients to decrease the mortality rate of large intestine cancer. The need for annual re-examination of all patients having undergone prior excision of colon cancer is emphasized; the remaining colonic mucosa should be regarded as potential cancer-bearing tissue. Consistent early recognition of colon cancer awaits development, refinement, and the wider application of more precise radiological techniques.

1942 **DIAGNOSIS AND TREATMENT OF CANCER OF THE BILIARY TRACT AND PANCREAS.** *(Rev.)(Fr.)* Ryncki, P. V. (Surg. Clin., U. Lausanne, Switzerland). *Praxis* 57(14):487-490, 1968.

1943 **TUMOUR PRODUCTION IN GLANDULAR STOMACH OF RAT BY N-METHYL-N'-NITRO-N-NITROSOGUANIDINE.** *(E.)* Sugimura, T. (Natl. Cancer Ctr. Res. Inst., Tokyo, Japan) and S. Fujimura. *Nature* 216(5118):943-944, 1967.

1944 **HEMOBILIC SYNDROMES: REPORT OF 5 CASES.** *(It.)* Beretta, T. ("A. Murri" Munic. Hosp., Fermo, Italy). *Minerva Med.* 58(97):4337-4341, 1967.

1945 ***ESCHERICHIA COLI* IN ENTERIC FEVER.** *(E.)* Thiruvengadam, K. V. (Stanley Med. Coll. Hosp., Madras, India), K. Sharmila and N. Mohamed. *Lancet* 2(7521):895-896, 1967.

1946 **A CASE OF ESOPHAGEAL ULCERATION COMPLICATING ENDOBRACHYESOPHAGUS: GASTROENTEROSTOMY, VAGOTOMY AND GASTRODUODENOJEJUNAL "VICIOUS CIRCLE."** *(Fr.)* Hureau, J., J. P. Bourdais and P. Vayre. *Presse Med.* 75(41, Suppl.):120, 1967.

1947 **LARGE, SOLITARY, NONPARASITIC CYST OF THE LIVER ASSOCIATED WITH A POLYCYSTIC PANCREAS. [ORAL COMMUNICATION; GASTROENT. SOC. MEDITERRANEAN SHORE, JUNE 17, 1967.]** *(Fr.)* Rampal, M., H. Pietri, A. Gauthier, J. Figarella and G. François. *Presse Med.* 75(43):2191, 1967.

1948 **REOPERACIONES EN VIAS BILIARES POR LESIONES QUIRURGICAS (SECONDARY OPERATIONS ON THE BILIARY TRACT FOR SURGICAL LESIONS).** *(Sp.)* Lasala, A. J. and L. A. Molmenti. Buenos Aires, Lopez, 1966, 304 pp.

1949 **FISTULAS AFTER GASTRECTOMY. [ORAL COMMUNICATION; 69TH FRENCH SURG. CONGRESS, PARIS, OCT. 2-7, 1967]** *(Fr.)* Witz, J. P., J. N. Maillard, J. Trémolières and E. Péquignot. *Presse Med.* 76(3):132, 1968.

1950 **A PEDIATRIC EMERGENCY: THE DIAGNOSIS OF VOMITING IN EARLY INFANCY.** *(Rev.)(Fr.)* Lafourcade, J. (Hosp. Sick Children, Paris, France) and J. Cruveiller. *Presse Med.* 76(7):323-326, 1968.

1951 **OCCLUSION AFTER LAPAROSCOPY. [CASE REPORT]** *(Fr.)* Mercadier, M. (La Pitié Hosp., Paris, France), G. Terris, D. Mellière, P. Camplez, J. P. Clot, F. Eudel and G. Schaison. *Presse Med.* 75(36):1807-1808, 1967.

1952 **GASTRIC VARICES IN PORTAL AND SPLENIC HYPERTENSION. [CASE REPORT]** *(It.)* Franchini, A. (Inst. Gen. Clin. Surg., U. Bologna, Italy), A. Murgia, A. Sbriccoli and R. Bellomo. *Minerva Med.* 59(8):367-376, 1968.

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2006 RELATION OF ESOPHAGEAL REFLUX TO LOWER ESOPHAGEAL SPHINCTER PRESSURES DECREASED BY ATROPINE.

(E.) Skinner, D. B. (Johns Hopkins Hosp., Baltimore, Md.) and T. F. Camp, Jr. *Gastroenterology* 54(4):543-551, 1968.

In 48 asymptomatic males (18-25 yr old) without hiatus hernias, intraesophageal pressures were determined by means of 3 fluid-filled polyvinyl tubes (internal diameter 0.034 inch) with open ends spaced at 5-cm intervals. Gastroesophageal reflux was quantitated under standardized conditions, after instillation of 300 ml of a mixture of barium sulfate and 0.1 N HCl, by pH monitoring with the tip of the pH electrode 5 cm above the upper margin of the lower esophageal sphincter; reflux, defined as a drop in pH to below 4.0, occurred in only one subject under supine resting conditions but could be elicited in 40% of these subjects by postural and respiratory maneuvers (Valsalva maneuver, Müller maneuver, coughing). The results of the manometric studies showed that the level of the effective diaphragmatic hiatus (pressure inversion point during respiration) was usually straddled by the lower esophageal sphincter (zone of pressure greater than gastric pressure), but there was no consistent relation between this point and the location of the pH rise as a Beckman intestinal pH electrode was withdrawn from the stomach into the esophagus. This point ranged from 2.5 cm below to 4 cm above the pressure inversion point, being above it in 37 of 48 subjects (more than 1 cm above it in 20 of 37) and below it in 8 subjects (more than 1 cm below in 3 of 8). Atropine sulfate (1 mg i.v.) decreased the length of the lower esophageal sphincter in 33 of 48 subjects and 1 of 8 saline-treated controls; the sphincter was abolished entirely in 4 subjects, although increasing in length in 10, and the mean length decreased from 2.5 to 1.7 cm. The maximum pressure in the sphincter decreased from an average of 6.7 mm Hg to 2.7 mm Hg, being decreased by atropine in 42 of 48 subjects (2 showed an increase) and by saline in 3 of 8 controls. The ratio between the maximum sphincter pressure and the gastroesophageal pressure difference decreased in 40 of 48 subjects, increased in 4 and remained unchanged in 4 after injection of atropine. Atropine, however, had no effect on the incidence of reflux. Whereas 25 of the 48 subjects never showed reflux, 8 showed reflux only before atropine, 4 only after atropine, and 11 both before and after atropine; of 55 episodes of reflux, 26 occurred before atropine and 29 after. There was no correlation between the incidence of reflux and the location of the pH rise in relation to the diaphragmatic hiatus, nor between the incidence of reflux and the length or pressure of the esophageal sphincter, either before or after atropine. Intraluminal pressures measured by uninfused tubes in the lower esophagus are therefore of doubtful significance in evaluating the competency of the gastroesophageal junction.

2007 CANDIDA INFECTION OF THE ESOPHAGUS.

(E.) Holt, J. M. (Radcliffe Infirm., Oxford, England). *Gut* 9(2):227-231, 1968.

Among 13 adult patients (3 men and 10 women, 33-89 yr old) with esophageal candidiasis seen during a 10-yr period, the principal symptom was difficult and painful swallowing, associated in 9 cases with persistent retrosternal pain (in 4 of 9 radiating to the back); 11 of these patients also had oral thrush, and 8 suffered from vomiting. The diagnosis was confirmed by barium-swallow X-ray in 9 cases (including 3 in which this was the only evidence), by necropsy in 3 and by esophageal biopsy in 1. All 13 patients were treated with mycostatin, 6 being cured and one showing improvement; the remaining 6 died in 1-4 weeks. It is of interest that only 6 of the 13 had received corticosteroids, which are sometimes held responsible for the development of candidiasis, and that all 6 were neutropenic as a result of their underlying disease. Of the other 7 patients, only one had received antibiotic therapy, and 2 of the cures with mycostatin were achieved despite concomitant treatment with tetracycline and prednisolone, resp. It is concluded that granulocytopenia *per se*, rather than prior antibiotic or corticosteroid therapy, may play a role in the pathogenesis of esophageal candidiasis.

2008 A COMPARATIVE STUDY OF SYMPTOM RELIEF IN ESOPHAGEAL CANCER WITH THE DEVELOPMENT OF A USEFUL INDEX OF PALLIATION.

(E.) Clark, R. L. (Johns Hopkins U. Med. Sch., Baltimore, Md.) and S. Lott. *Radiology* 90(5):971-974, 1968.

A follow-up study of 64 cases (male:female ratio of 4:1, 38-87 yr old, about half Negro) of squamous cell carcinoma of the esophagus selected at random from the files of the Johns Hopkins Hospital for the period 1951-64 showed that the overwhelming majority died within one year of diagnosis (8 survivors at 1 yr and 2 survivors at 5 yr). Forty four of these patients had been heavy smokers and/or heavy drinkers; 13 had a history of prior esophageal disease (hiatus hernia, esophagitis, achalasia, diverticula, etc.). The median survival in months from the date of diagnosis was 4.0 (range 0.3-33.5) in 21 cases treated by X-ray, 1.0 (range 0.1-108) in 24 cases treated by surgery, and 4.0 (0.4-29.5) in 12 cases treated by X-ray and surgery combined. Results were particularly good in the 13 patients given more than 4000 r (median survival of 6.5 months, range 2.5-33.5) and in the 5 patients treated by gastrostomy plus X-ray (median survival of 8.0 months, range 1-29.5), although the longest survival (108 months) was obtained following insertion of a Berman tube prosthesis. The median duration of palliation from the end of treatment (in months), considering factors such as weight loss, dysphagia, fistula formation, esophagitis, tumor recurrence, and the length of the hospital stay, was 3.0 (range <1-33) in patients treated by X-ray, <1.0 (range <1-108) in patients treated by surgery, and 4.0 (range <1-24) in patients given X-ray and surgery. In order to facilitate comparison of the effectiveness of various methods of palliative treatment, a palliation index was derived representing that percent of post-therapy life which was useful or considered palliated for any given number of patients after any given type of treatment: $\text{P.I.} = (\Sigma P_1/S_1 + P_2/S_2 + \ldots P_n/S_n)(100/n)$ where P_x is the duration of palliation after treatment in case x, S_x is the duration of survival from date of diagnosis in case x, and n is the total number of cases treated by a particular method. The P.I. was 46% in patients treated by X-ray alone (30% in those given less than 4000 r and 56% in those given more than 4000 r), 33% (range 25-44% depending on the operation) in those treated by surgery alone, and 54% in patients given both surgery and X-ray (48% with a Souttar tube and 62% with gastrostomy). It is concluded that radiation is certainly as effective as surgery for palliative purposes in most cases of esophageal cancer.

2009 ANEMIA AND HIATUS HERNIA. *(E.)* Windsor, C. W. O. (Queen Elizabeth Hosp., Birmingham, England) and J. L. Collis. *Proc. Roy. Soc. Med.* 61(3):213-216, 1968.

A review of 450 consecutive cases of hiatus hernia operated on in a 13-yr period revealed a total of 68 patients with anemia (average hemoglobin of 8.5 g%). This anemia was not due to either dietary deficiencies or associated disease, and was corrected in all cases by repair of the hernia. It was also not due to esophagitis, since this was found in only 17% of anemic patients with sliding hernias and 27% of nonanemic patients with sliding hernias, as well as in 62% of patients with irreducible hernias. Furthermore, paraesophageal hernia, in which the frequency of anemia was the highest, is not associated with reflux. The 68 anemic patients included 37 of 326 (11%) with sliding hernia, 22 of 74 (30%) with paraesophageal hernia, and 9 of 50 (18%) with fixed or irreducible hernia; 24 of these patients had melena or hematemesis. It is therefore concluded that the site of bleeding in hiatus hernia, resulting in anemia, is the portion of the stomach which slides in and out of the hiatal opening during respiration and which is subjected to trauma from contact with the crural edge. This effect is particularly marked with relatively large hernias and narrow hiatal openings.

2010 THE HIATUS HERNIA-ESOPHAGITIS-ESOPHAGEAL STRICTURE COMPLEX: TWENTY YEAR PROSPECTIVE STUDY. *(E.)* Palmer, E. D. (VA Hosp., East Orange, N. J.). *Amer. J. Med.* 44(4):566-579, 1968.

The results of upper gastrointestinal radiography, esophagoscopy and gastroscopy of an unstated number of patients (about 67% male) during the period 1946-66 revealed 1011 patients with one or more esophageal lesions: 786 cases of hiatus hernia (82.9% male), 413 cases of esophagitis (82.3% male, including 188 of the hiatus hernia patients), and 45 cases of benign noncorrosive cicatricial esophageal stricture (78% male, including 34 patients with hiatus hernia and 11 with esophagitis). However, the symptoms which prompted examination (pyrosis, regurgitation, dyspepsia, pain, dysphagia, and bleeding) were not ascribable to the lesion detected in 48.9-74.7% of the cases. Thus, approximately half the patients with hiatus hernia, with or without associated esophagitis, had no symptoms that could be ascribed to either disorder, and approximately 75% of the patients with esophagitis and no hiatus hernia had no symptoms ascribable to the esophagitis. Classic symptoms of hiatus hernia were found in only 8.9% of patients with hiatus hernia, and acute pain suggestive of coronary artery disease was encountered in 13% of patients with symptomatic hiatus hernia. The differential diagnosis of hiatus hernia thus remains a serious problem. Significant upper gastrointestinal bleeding was observed in 269 patients, including 181 with esophagitis and 191 with hiatus hernia. However, esophagitis was the cause of the bleeding in only 40% of those with esophagitis; esophageal varices were responsible for bleeding in 49 cases and duodenal ulcer was responsible in 69 cases. Hemorrhage from esophagitis was quite severe, necessitating the transfusion of an average of 3115 ml of whole blood per episode. Gastric lavage with ice-water was the most effective emergency measure for the treatment of bleeding due to esophagitis. Many of these patients showed associated gastrointestinal diseases, which in many cases were responsible for the presenting symptoms. Thus, esophageal varices were found in 12.6% of patients with hiatus hernia and 33.2% of those with esophagitis, gastric ulcer was found in 8.0% and 7.5%, resp., duodenal ulcer in 20.0% and 16.2%, diverticulosis coli in 13.5% and 2.7%, cirrhosis of the liver in 11.1% and 33.2%, and gallstones in 14.0% and 4.6%, resp. Saint's triad (hiatus hernia, gallstones and large intestine diverticula) was observed in 10.2% of the patients with hiatus hernia. With regard to the treatment of hiatus hernia, emphasis was on weight control, living habits and drugs, surgery being resorted to in only 3.9%, usually for associated esophagitis and bleeding. Diet and drugs were demonstrated to be ineffective in the treatment of esophagitis, which underwent spontaneous healing in many cases. For example, follow-up of 142 untreated patients with esophagitis without stricture, who were examined at intervals of up to 108 months, revealed no change in 20, aggravation of the esophagitis in 15, improvement in 17, and disappearance of esophagitis in 35 cases. Esophageal stricture was treated aggressively and successfully by bouginage, although many patients required serial dilatation over long periods.

2011 THE ABDOMINAL REPAIR OF ESOPHAGEAL HIATAL HERNIA. *(E.)* Vansant, J. H. (Norfolk Gen. Hosp., Va.). *Surgery* 63(6):911-916, 1968.

Review of a series of 43 patients (20 men and 23 women, 28-76 yr old, most 50-70) treated for sliding hiatal hernia by means of an abdominal incision and drainage procedure confirmed the fact that abdominal repair facilitates simultaneous treatment of the peptic ulcer diathesis and other upper abdominal lesions which often accompany a hiatal hernia. Symptoms had been present for >5 yr in 29 of the 43 cases and for >10 yr in 21 of 29. A hiatal hernia was revealed by X-ray in 40 of the 43, the 3 others having advanced esophagitis with a fixed esophagogastric junction. All 36 patients tested had a free gastric HCl of >10 mEq/liter, and 15 of 36 had 40-90 mEq/liter. Esophagoscopy revealed esophagitis in 31 of 31 cases examined (verified by biopsy in 23 of 31) and often demonstrated strictures and reflux unrecognized by X-ray. More than 50% of the patients had other upper abdominal lesions. Peptic ulcers were found in 16 and gallstones in 6. The indications for surgery were uncontrolled esophagitis (21 cases), esophageal obstruction or severe blood loss. Abdominal repair of the hernia was combined with pyloroplasty in 39 cases, vagotomy in 41, partial gastrectomy in 4, and cholecystectomy in 6 (with gallstones). There were no postoperative deaths. Complications included wound infection in 6 cases and thrombophlebitis in 2. Follow-up has been longer than 2 yr in 15 cases and 1-2 yr in 20 cases. Symptoms have not recurred in any case, although 2 of the 29 patients X-rayed showed signs of recurrent hernia. Symptoms related to pyloroplasty and vagotomy, including postprandial nausea, diarrhea, cramps, bloating and (in one case) the classical dumping syndrome, were reported by 21 patients but responded to treatment with a low-carbohydrate high-fat diet, abstinence from fluids with meals, and antispasmodics.

2012 THE SURGICAL APPROACH TO ESOPHAGEAL ACHALASIA IN CHILDREN. *(E.)* Tachovsky, T. J. (Mayo Grad. Sch. Med., U. Minnesota, Rochester), H. B. Lynn and F. H. Ellis, Jr. *J. Pediat. Surg.* 3(2):226-231, 1968.

Among 287 patients who underwent modified Heller operations at the Mayo Clinic during the period 1950-67, 15 (10 males and 5 females) had the onset of symptoms of achalasia before the age of 15 (mean 8.5); 9 of these 15 were operated on before the age of 15 and 6 were operated on at 15 or older. The most common symptom (in 14 of 15 cases) was regurgitation with or soon after meals, accompanied by dysphagia (13 cases), weight loss (10 cases), persistent night cough (5 cases) and substernal pain (3 cases); 3 of the 15 had pulmonary complications secondary to aspiration of regurgitated food. Esophagoscopy was carried out in 5 cases and esophageal motility studies were performed in 10. An average of 7.8 prior attempts at esophageal dilatation, producing variable periods of relief extending up to 2 yr and 9 months in one case, had been made in 8 of the 15 patients. The mean duration of hospitalization following the modified Heller esophagomyotomy was 6.4 days in 14 uncomplicated cases, the remaining patient being hospitalized for 20 days due to postoperative empyema. One patient was lost to follow-up; in the other 14 cases, followed for a mean of 6.9 yr, the results were excellent in 12, good in 1 (with occasional dysphagia), and fair in 1 (with occasional regurgitation); the importance of early diagnosis and prompt treatment is illustrated by the fact that there was a delay of 10-40 yr between onset of symptoms and surgery in the latter 2 cases. Bouginage is felt to be of temporary value at best in these cases, and forceful dilation using pneumatic or hydrostatic dilators is difficult in children. Esophagomyotomy according to the modified Heller technique is therefore considered to be the primary treatment of choice for pediatric achalasia.

2013 LOWER ESOPHAGUS LINED WITH COLUMNAR EPITHELIUM: MORPHOLOGICAL AND PHYSIOLOGICAL CORRELATION. *(E.)* Heitmann, P. (U. Chile Sch. Med., Santiago), T. Strauszer, J. Sapunar and A. Larrain. *Gastroenterology* 53(4):611-624, 1967.

The case reports of 2 men with abnormal esophageal mucosal lining are presented. Esophageal motility studies were performed and intraluminal pressures were measured and compared with simultaneous radiographic studies. The junction of squamous and columnar epithelium appeared roentgenologically as a mid-esophageal ring which was static and which appeared to exhibit no function. The tubular organ behaved as esophagus above, at, and below this mucosal junction. A segment with distinct motor behavior but no resting high pressure was present at the junction of the tubular esophagus with the herniated stomach in 1 patient who showed free gastroesophageal reflux and gastric hypersecretion. The other patient had a normal high pressure zone displaced into the thorax, normal gastric secretion, and no demonstrable gastroesophageal incompetence. In 1 patient studied, acid production by the mucous epithelium lining the esophagus could not be demonstrated.

2014 BOUGINAGE AND STEROIDS USED SINGLY OR IN COMBINATION IN EXPERIMENTAL CORROSIVE ESOPHAGITIS. *(E.)* Knox, W. G. (St. Luke's Hosp. Ctr., New York City), J. R. Scott, H. A. Bintel, R. Guthrie and R. E. McCabe. *Ann. Surgery* 166(1):930-941, 1967.

Severe corrosive esophageal burns were produced in 68 dogs in order to analyze the effect of steroids and/or bouginage in preventing stricture in severe esophagitis. Complete stenosis could be avoided if bouginage were instituted by the 7th to 9th postburn day and repeated at 3-4 day intervals for 2 months. Only 2 of the 9 dogs receiving 0.5 mg Prednisolone per kg daily developed severe stenosis, while 8 of the 12 receiving 0.1 mg per kg daily developed severe stenosis. When both steroid therapy and bouginage were given, bouginage was required less frequently and not at all after one month postburn.

2015 AN EFFECTIVE OPERATION FOR HIATAL HERNIA: AN EIGHT YEAR APPRAISAL. *(E.)* Hill, L. D. (Mason Clinic, Seattle, Wash.). *Ann. Surg.* 166(1):681-692, 1967.

The indications, technique, and follow-up of a series of 149 consecutive operations for hiatal hernia are discussed. The most common indication for surgery was intractibility or failure to respond to medical management, followed by esophagitis. The observations suggest that replacement of the gastroesophageal junction subdiaphragmatically and maintainance of it there permanently serves to prevent recurrent herniation as well as reflux. The surgical procedures are discussed in detail. In the 8 year follow-up there has been no mortality and no anatomic recurrence.

2016 OCCURRENCE OF PEPTIC ULCER IN COLON USED FOR ESOPHAGEAL REPLACEMENT. *(E.)* Malcolm, J. A. (VA Hosp., New York City). *J. Thorac. Cardiov. Surg.* 55(6):763-772, 1968.

The case history of a 40 year old male patient with peptic ulcer in a colon esophagoplasty is presented. The facts that this complication is rare, and that in spite of lower esophagectomy, complete vagotomy was neither anatomically or physiologically achieved, make this case noteworthy. Intermittent epigastric substernal pain was first reported 18 months after esophagus reconstruction. Esophagoscopy at that time failed to reveal the ulcer. Symptoms were initially relieved by an ulcer regimen, but after 9 months, pain became intractable Barium examination revealed the ulcer to be immediately proximal to the distal anastomosis. The ulcer was excised and the patient recovered with no further epigastric pain or other indication of functional abnormality of the colon esophagoplasty.

2017 TECHNIQUE FOR THE TREATMENT OF CONGENITAL TRACHEO-ESOPHAGEAL FISTULA. *(Fr.)* Boureau, M. (Bretonneau Hosp., Paris, France), H. Bensahel and C. Demeulenaere. *Presse Med.* 76(5):212-213, 1968.

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2018 GASTROPEXY AND HIATUS HERNIA. *(Fr.)* Boerema, I. (Wilhelmina Hosp., Amsterdam, Netherlands). *Presse Med.* 75(45):2275-2277, 1967.

2019 CONSERVATIVE TREATMENT OF PATIENTS SUFFERING FROM HIATUS HERNIA. *(Rus.)* Yudin, A. A. *Klin. Med.* 66(2):39-44, 1968.

2020 THE MECHANISM OF DYSPHAGIA IN SO-CALLED CARDIOSPASM. *(Rus.)* Grebenev, A. L., S. A. Zelikovich and T. A. Timofeeva. *Klin. Med.* 66(2): 29-39, 1968.

2021 SURGICAL TREATMENT OF PATIENTS WITH PORTAL HYPERTENSION AT THE HEIGHT OF ESOPHAGEAL HEMORRHAGE. *(Rus.)* Prutovykh, N. N. (Novosibirsk Med. Inst., USSR). *Vestn. Khir. Grekov* 100(4):18-21, 1968.

2022 ESOPHAGEAL ANGIOFIBROMA. *(Rus.)* Borisov, B. F. (Donetsk Med. Inst., USSR). *Klin. Khirurgiia* (1):81-82, 1968.

2023 RUPTURE OF THE OESOPHAGUS FROM BLUNT EXTERNAL TRAUMA. *(E.)* Blair, D. W. (Royal Infirmary, Aberdeen, Scotland). *J. Roy. Coll. Surg. Edinb.* 13(1):46-48, 1968.

2024 CLINICAL WORK: ESOPHAGEAL DYSKINESIA DUE TO BOTULISM. *(Fr.)* Poirier, A. and J. P. Poirier. *Gaz. Med.* 74(28):5253-5260, 1967.

2025 ESOPHAGEAL CANCER AND CARDIOSPASM. *(Fr.)* Lortat-Jacob, J. L., C. A. Richard, F. Fekete and J. Testart. *Gaz. Med.* 74(28):5231-5252, 1967.

2026 DIFFUSE SPASM AND MUSCULAR HYPERTROPHY OF THE LOWER ESOPHAGUS. [REPORT OF TWO CASES] *(E.)* Westgaard, T. (U. Virginia Sch. Med., Charlottesville) and T. E. Keats. *Radiology* 90(5): 1001-1005, 1968.

2027 ATRESIA OF THE ESOPHAGUS: FACTORS AFFECTING SURVIVAL IN 249 CASES. *(E.)* Koop, C. E. (Surg. Clin. Children's Hosp., Philadelphia, Pa.). *Z. Kinderchir.* 5(3/4):319-333, 1968.

2028 RESULTS OF TWENTY YEARS EXPERIENCE WITH ESOPHAGEAL REPLACEMENT FOR BENIGN DISORDERS. *(E.)* Mullen, D. C. (Duke Univ. Med. Ctr., Durham, N. C.), W. G. Young Jr., and W. C. Sealy. *Ann. Thorac. Surg.* 5(6):481-488, 1968.

2029 ESOPHAGEAL REPLACEMENT WITH A GASTRIC TUBE IN INFANTS AND CHILDREN. *(E.)* Burrington, J. D. (Hosp. Sick Children, Toronto, Ontario) and C. A. Stephens. *J. Pediat. Surg.* 3(2):246-252, 1968.

2030 ESOPHAGITIS. *(Fr.)* Chirat, F. *Franc. Med.* 31(3):121-125, 1968.

2031 HIATAL HERNIA. CLINICAL STUDY OF 89 CASES. *(Sp.)* Vasconcellos, D. (Gastroenterol. Inst. Recife, Brazil) and T. B. Novais. *Rev. Esp. Enferm. Apar. Dig.* 27(3):439-452, 1968.

2032 THE SURGICAL TREATMENT OF BLEEDING ESOPHAGEAL VARICES INCLUDING THE INDICATION FOR PORTACAVAL ANASTOMOSIS. *(Ger.)* Stelzner, F. (Hamburg U. Surg. Clin., Eppendorf, Germany). *Therapiewoche* 18(20):843-844, 1968.

2033 THE INTERNAL MEDICAL TREATMENT OF BLEEDING ESOPHAGEAL VARICES, INCLUDING THE INDICATION FOR PORTACAVAL ANASTOMOSIS. *(Ger.)* Goebell, H. (Phillipp U. Med. Clin., Marburg/ Lahn, Germany) and G. A. Martini. *Therapiewoche* 18(20): 839-842, 1968.

2034 TRUE ESOPHAGEAL FISTULAS. *(Rus.)* Zhmur, V. A. (Clin. Hosp. No. 6, Moscow, USSR). *Khirurgiia* 44(4):113-117, 1968.

2035 MULTICHANNEL ELECTROESOPHAGOGRAPHY TO ESTIMATE EFFECTIVENESS OF THE ESOPHAGUS CARCINOMA RADIOTHERAPY. *(Rus.)* Akhundova, M. D. (Inst. Exp. Clin. Oncol. Acad. Med. Sci. USSR, Moscow) and Ie. M. Ivanova. *Med. Radiol.* 13(3):16-20, 1968.

2036 A CONTRIBUTION TO THE STUDY OF THE MECHANISM OF BLEEDING OF ESOPHAGEAL VARICES IN PORTAL HYPERTENSION (PRELIMINARY REPORT). *(E.)* Correa Netto, A. (Fac. Med., U. Sao Paulo, Brazil) and M. Okumura. *Rev. Paul. Med.* 71(3):125-132, 1967.

2037 CAVERNOUS HEMANGIOMA OF THE ESOPHAGUS. *(Ger.)* Weichselbaumer, W. (ENT Dept., Hera Sanat., Vienna, Austria). *Mschr. Ohrenheilk.* 102(5):333-340, 1968.

2038 LEIOMYOMA OF THE ESOPHAGUS. *(It.)* Gaetini, A. (Inst. Surg. Anat., U. Turin, Italy). *Arch. Sci. Med. (Torino)* 124(5):523-537, 1967.

2039 BENIGN ESOPHAGEAL TUMORS. *(Rus.)* Romanova, G. M. (Leningrad Pediat. Med. Inst., USSR). *Vestn. Khir. Grekov* 100(5):22-25, 1968.

2040 ACQUIRED NONTRAUMATIC BENIGN ESOPHAGOBRONCHIAL FISTULAS. *(Fr.)* Saegesser, F. (Surg. Clin., Lausanne U., Switzerland), D. Waridel and F. Aguet. *Helv. Chir. Acta* 35(1/2):11-20, 1968.

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2041 **ESOPHAGEAL CARCINOMA.** *(Ger.)* Kretschmer, G. (Path. Anat. Inst., U. Vienna, Austria). *Wien. Klin. Wschr.* 80(22):425-431, 1968.

2042 **PRIMARY AMYLOID TUMOUR OF THE OESOPHAGUS TREATED BY COLON TRANSPLANT.** *(E.)* Solanke, T. F. (U. Coll. Hosp., Ibadan, Nigeria), E. O. Olurin, F. Nwakonobi and I. O. K. Udeozo. *Brit. J. Surg.* 54(11):943-946, 1967.

2043 **LOWER ESOPHAGEAL WEBS OR RINGS.** *(E.)* Wichern, W. A. (Roosevelt Hosp., New York City). *New York J. Med.* 68(13):1834-1835, 1968.

See also abstract no.: 1864

STOMACH

(Gastric ulcer is placed with peptic ulcer)

2044 **GASTRIC CANCER: A REVIEW OF CASES FROM THE SINAI HOSPITAL OF DETROIT CANCER REGISTRY.** *(E.)* Salzstein, H. C. (Sinai Hosp., Detroit, Mich.), G. H. Mandell, G. Rajasakeran and S. Kantor. *J. Abdom. Surg.* 11(4):105-110, 1968.

The records of 111 patients who were discharged with a diagnosis of stomach cancer between 1953 and 1959 were analyzed retrospectively for survival of 5 yr or more and the results were correlated with the duration of illness and location, type and extent of the lesion. Of these 111 patients, 89 were subjected to surgery, including 52 "curative" resections (postoperative mortality of 9.6%) and 37 other procedures. Two patients were lost to follow-up; of the remainder, 67% of the entire series were alive 2 months after diagnosis, 44% were alive after 6 months after diagnosis, 29% survived 1 yr after diagnosis, and 7 patients (13% of those resected) survived for more than 5 yr and must be considered cured. Two of these (women, 43-63 yr old) had a favorable prognosis initially and one (68-yr-old woman) had a questionable prognosis; all 3 were treated by subtotal resection. One was a well-differentiated polypoid lesion on the lesser curvature, one was a superficial ulcer on the lesser curvature with focal carcinoma at the margin, and one was a well-differentiated mucinous carcinoma on the greater curvature extending through the muscle and serosa. A fourth patient had been given subtotal gastric resection for a lymphosarcoma of the lesser curvature, deeply involving the stomach wall. The other 3 patients (2 men and 1 woman, 46-69 yr old), however, had originally been judged to have a poor prognosis and had been given only palliative surgery (total gastrectomy in one case). One of these had a poorly differentiated scirrhous carcinoma extending through the wall to the serosa and involving the pylorus, one had a poorly differentiated adenocarcinoma involving the duodenum, pylorus and head of the pancreas, and the third had a poorly differentiated carcinoma of the lesser curvature involving the esophagus and a subdiaphragmatic lymph node. This last patient showed no evidence of carcinoma at reoperation 3 yr after total gastrectomy, but subsequently developed esophagitis. It is concluded that there is no correlation between survival and either the extent or microscopic appearance of the disease. Furthermore, there is no easy answer to what can be done to improve the survival rate from gastric carcinoma. Radical subtotal gastrectomy, leaving a moderate amount of stomach at the cardia but transecting the duodenum just above the ampulla of Vater and extirpating the omentum and the lymph nodes along the lesser curvature, at the porta hepatis, along the middle colic artery and along the splenic vein, is urged as the treatment of choice.

2045 **EFFECT OF VAGOTOMY ON GASTRIC MUCOSAL BLOOD FLOW.** *(E.)* Bell, P. R. (West. Infirm., Glasgow, Scotland) and C. Battersby. *Gastroenterology* 54(6):1032-1037, 1968.

In 10 of 12 fasted mongrel dogs, anesthetized with intravenous thiopentone and respirated with a 7:3 mixture of N_2O and O_2 at a rate which maintained a constant arterial pCO_2, vagotomy resulted in a rapid and significant drop in gastric mucosal blood flow (mean 39% or 0.38 ml/g/min) as measured by the clearance of radioactive krypton. This decrease was maintained for at least 2 hr and was not produced by sham operation. However, there was a wide variation in response (decreases of 29-74%), and 2 of the 12 dogs showed no significant response to vagotomy: one of these showed a decrease in mucosal blood flow after mobilization of the esophagus, but no further decrease after vagotomy, while the other showed a slight increase in blood flow after vagotomy. No explanation is offered for the variability in the results, but it is concluded that vagotomy has a place in the treatment of bleeding from peptic ulcers and acute gastric erosion.

2046 **ETHANOL DAMAGE TO CANINE OXYNTIC GLANDULAR MUCOSA.** *(E.)* Davenport, H. W. (Dept. Physiol., U. Michigan, Ann Arbor). *Proc. Soc. Exp. Biol. Med.* 126(3):657-662, 1967.

Irrigation of vagally denervated (Heidenhain) pouch of the canine oxyntic glandular mucosa of the stomach with ethanol solutions of 8% or less did not damage the mucosal barrier as judged by the fluxes of Na^+, K^+ and H^+. Solutions of 14 and 27% broke the barrier, as indicated by the increase of the ions fluxes across the mucosa. The effect of ethanol upon the barrier did not depend on pH and was essentially the same when administered in 100 mM HCl or in 30 mM phosphate buffer (pH = 7.5). The rate of alcohol absorption was directly proportional to its concentration; its damaging effect was dependent upon the concentration in contact with the mucosa and not upon the quantity absorbed. Low concentrations of ethanol (8% or less) stimulated acid secretion in 17 of 18 dogs. Histamine was not identified in the arterial or gastric venous blood of anesthetized animals when the stomach was filled with 8 or 14% ethanol.

2047 **INFLAMMATORY PSEUDOTUMORS OF THE STOMACH. FOLLOW-UP REPORT AND CORRECTION.** *(E.)* Burkhart, C. R. (Virginia Med. Coll., Richmond) and R. H. Wilkinson, Jr. *Cancer* 21(6):1052-1054, 1968.

Autopsy performed in a 27-year-old Negro woman who died 2.5 years following 70% subtotal gastrectomy which at the time apparently revealed an eosinophilic granuloma of the stomach, demonstrated a scirrhous carcinoma of the stomach with metastases. The case is reported as a correction of the original report and to emphasize the difficulties which may be encountered in differentiating inflammatory pseudotumor from scirrhous carcinoma of the stomach.

2048 **ASPIRIN INJURY TO THE GASTRIC MUCOSA. GASTROCAMERA OBSERVATIONS OF THE EFFECT OF pH.** *(E.)* Thorsen, W. B. Jr. (U. Wisconsin Med. Sch., Madison), D. Western, Y. Tanaka and J. F. Morrissey. *Arch. Intern. Med.* 121(6):499-506, 1968.

The study of the acute effects on the gastric mucosa of acetylsalicylic acid in 32 normal subjects (18 men and 14 women; average age, 32) revealed the occurrence of hemorrhagic lesions in 10 of 20 who ingested aspirin in an acid solution and in only 4 of the 26 subjects who took the compound in an alkaline environment. Although hemorrhage, petechiae, or ecchymoses were found, erosions and ulcerations were not seen on the gastrocamera films. The findings suggest that the injurious effect on the gastric mucosa is caused by the acetylsalicylic acid and not by its sodium salt.

2049 STUDIES OF GLOBULIN FRACTIONS IN PATIENTS WITH GASTRIC CARCINOMA USING THE OUCHTERLONY TEST. *(E.)* Adamczyk, B. (Inst. Oncology, Cracow, Poland) and J. Kulpa. *Pol. Med. J.* 7(1): 139-145, 1968.

The study of globulin fractions according to the Ouchterlony method (as modified by Hitzig) revealed that, α_2- and β_2-macroglobulin, and α_2- and β-lipoprotein were higher in 26 patients with stomach cancer than in 14 healthy controls. The remaining fractions (β_2-globulin, siderophilin, and γ-globulin) were normal.

2050 EXPERIENCES IN EARLY GASTRIC CANCER WITH SPECIAL REFERENCE TO PREOPERATIVE DIAGNOSIS. *(E.)* Ono, G. (Dept. Int. Med., Shinshu U., Matsumoto, Japan), T. Kojima, H. Okuaki, J. Koshi, T. Kobayashi, K. Kashiwabara, K. Koitabashi and K. Nakajima. *Med. J. Shinshu U.* 12(1):57-69, 1967.

Radiologic, bioptic, endoscopic, and cytologic signs of early stomach cancer (12 adenocarcinomas, 2 undifferentiated carcinomas, and 1 anaplastic carcinoma) as diagnosed in 15 patients (8 men and 7 women; 40-69 years old) are presented. Endoscopic findings of rigidity, nodulation, and unevenness, with discoloration or hemorrhage of the gastric mucosa, as well as irregular mucosal folds, suggest the presence of malignancy. The differentiation between benign ulcer or stomach polyps and early gastric cancer was extremely difficult, but occasionally it could be confirmed by the bioptic procedure. Radiography following ingestion of barium meal appears to be the most reliable method for the detection of early lesions. The results demonstrate that all the techniques must be fully utilized for the early diagnosis of stomach cancer.

2051 MILK INTOLERANCE FOLLOWING GASTRIC OPERATIONS WITH SPECIAL REFERENCE TO LACTASE DEFICIENCY. *(E.)* Spencer, J. (Dept. Surg., Royal Postgraduate Med. Sch., London, England) and R. B. Welbourn. *Brit. J Surg.* 55(4):261-264, 1968.

Thirty-nine of 100 patients presented milk intolerance following stomach operations (including 62 subjected to Polya and 30 to Billroth-I). Highest lactase concentrations were found in biopsy specimens from the jejunum, ileum, and lower duodenum. Rapid lactose absorption was noted even in the presence of milk intolerance. Lactose-barium meals in 20 patients did not reveal lactase deficiency. The results suggest that lactase deficiency is not an important factor in the appearance of milk intolerance following gastrectomy.

2052 DIAGNOSTIC VALUE OF GASTROSCOPY. A SERIES OF 1721 EXAMINATIONS. *(Fin.)* Jussila, J. (Helsinki, Finland) and H. J. Salmi. *Duodecim* 84(9):602-607, 1968.

The accuracy of gastroscopy was verified by means of biopsy in 345 patients (among a total of 1721 patients studied gastroscopically) who underwent surgery. Histological agreement was found in 80 of the 99 cases with a gastroscopic diagnosis of gastric malignancy. Radiological and gastroscopic diagnoses were correct or suggestive of malignancy in, resp., 86% and 91% of the cases. Combined gastroscopy and X-ray examination accounted for a correct diagnosis in all but 2 of the 99 patients.

2053 CLINICAL AND METABOLIC STUDIES AFTER TOTAL GASTRECTOMY WITH A HUNT-LAWRENCE JEJUNAL FOOD POUCH. *(E.)* Scott, W. H. (Vanderbilt U. Med. Ctr., Nashville, Tenn.), D. H. Law IV, W. G. Gobbel Jr. and J. L. Sawyers. *Amer. J. Surg.* 115(2): 148-156, 1968.

Among 22 patients (17 men and 5 women; 36-81 years old), including 12 with stomach adenocarcinoma, 6 with malignant stomach lymphoma, 3 with Zollinger-Ellison syndrome, and 1 with Menetrier's disease, subjected to gastrectomy with Hunt-Lawrence jejunal pouch and Roux-en-Y esophagojejunostomy, 8 survived for 3-8 years without recurrence of their disease. Evaluation of the survivors revealed that their ability to gain and maintain weight, to eat in comfort, to return to normal activities, and to be free of dumping, diarrhea, and severe dietary restrictions was significantly better than in patients with other types of alimentary reconstruction following total gastrectomy. One patient subjected to the jejunal pouch procedure developed partial jejunal obstruction 28 months following gastrectomy and cobalt therapy, 2 developed pneumonitis in the third year following surgery, and one developed a lung abscess and died during the early postoperative period.

2054 STUDY OF THE GASTRIC CHANGES INDUCED BY PORTACAVAL ANASTOMOSIS IN THE RAT. *(Fr.)* Bel, A. (Med. Clinic D, Hosp. Croix-Rousse, Lyon, France), R. Levrat, J. Nesmoz and M. Girard. *Arch. Mal. Appar. Dig.* Suppl. (1):87, 1968.

A study was carried out on 42 Wistar rats with portacaval anastomosis. Macro- and microscopic examination of the stomach in 36 rats who died spontaneously revealed the presence of stomach ulceration in 21 of the 36, or 57%. It may be that the ulceration occurred during the postoperative period. Ulcers were seen as early as 10 days postoperatively, and 82% had ulcers in 30 days post-operatively. The ulcers resemble reserpine-induced ulcers, sometimes accompanied by gastric hemorrhage. Changes of gastric secretion in 10 animals with chronic gastric fistulas revealed a significant increase in secretory volume and free acid during the first week post-operative, then a decrease thereafter but with the level remaining above basal values. Presence of ulcers appears to be directly related to metabolic disorders resulting from the anastomosis in rat.

2055 THE USE OF TRIETHYLENETHIOPHOSPHORAMIDE AS AN ADJUVANT TO THE SURGICAL TREATMENT OF GASTRIC CARCINOMA. *(E.)* Longmire, W. P. (UCLA Sch. Med., Los Angeles, Calif.), J. W. Kuzma and W. J. Dixon. *Ann. Surg.* 167(3):293-312, 1968.

In a collaborative study involving 616 untreated gastric adenocarcinoma patients with no previous or concomitant carcinoma except squamous or basal cell skin carcinoma and with white blood cell counts of 4700 or above and preoperative platelet counts of 14,000 or above, the effects of triethylenethiophosphoramide (thioTEPA) on gastric cancer were investigated. Part I of the study involved 210 patients receiving a total thioTEPA dose of 0.8 mg/kg of body weight; in part II, 406 patients received 0.6 mg/kg. The incidence rates of concomitant diseases and postoperative complications were not significantly different in thioTEPA and control patients, although they were in patients dying within 30 days of surgery. The difference in early postoperative mortality rates and those occurring after 30 days were not significantly different in control and thioTEPA patients; there was also no difference when the causes of death were compared. The survival rates were significantly higher in the thioTEPA patients than in controls in both phases of the study during the first two years when there were no postoperative complications, but there were no significant differences in survival rates between thioTEPA and control patients with and without concomitant diseases, with postoperative complications, with positive lymph nodes, with and without serosal involvement, with and without organ removal, with and without recurrence, and subjected to different types of surgery. The survival rates for the group with positive lymph nodes, with serosal involvement, with other organs removed, and with cancer recurrence were significantly lower than those without these characteristics without regard to adjuvant therapy. There was no difference in the incidence of cancer at death between control and thioTEPA patients.

2056 TREATMENT OF GASTROINTESTINAL CANCER: CURRENT STATUS AND RECENT PROGRESS.

(E.) Sherlock, P. (Sloan-Kettering Cancer Ctr., New York City), A. N. Ehrlich, E. E. Pavon and M. A. Paglia. *Gastroenterology* 53(4):630-668, 1967.

The incidence, diagnosis, treatment, and prognosis of gastrointestinal cancer are presented in this comprehensive survey of the gastrointestinal tract and the related organs. The preferred treatment for esophagus cancer is surgery with or without prior radiation therapy, depending on the site and extent of the lesion. Surgery is the only satisfactory curative therapy for stomach cancer. Gastric lymphomas are usually treated by radiotherapy or chemotherapy; leiomyosarcomas are radioresistant and no chemotherapeutic agents have yet been found that are effective against them. Small intestinal cancer is treated surgically, or by radio- or chemotherapy, depending on its manifestations. Multiple carcinoid tumor patients have a higher incidence of adrenal hyperplasia, neuromyopathy, and gastric and duodenal ulcers; surgery and/or chemotherapy are the usual treatments. Radiation therapy is given before surgery in most cases of large bowel, rectal and anal melanoma; radiation after surgery is palliative for cancer recurrence. Pancreas cancer can be treated with pancreaticoduodenectomy, but other measures must be taken to correct the nutritional and metabolic deficiencies created by the operation. Liver cancer is diagnosed and managed by the following techniques: operative and transhepatic cholangiography; splenoportography; transaortic hepatic arteriography; radioactive liver scanning; surgery; and radiotherapy. Due to the etiological relationship between cholelithiasis and gallbladder and biliary tract cancer, cholecystectomy is recommended in cholelithiasis, whether advanced or early. Hyperbaric oxygenation of tissue, improved radiotherapy techniques, cryosurgery, lasers, and immunological therapy are now being investigated for their applications in cancer treatment.

2057 DIFFUSE HYPERPLASIA OF GASTRIC ARGYROPHIL CELLS AND MULTIPLE CARCINOID TUMORS. AN HISTORICAL AND ULTRASTRUCTURAL STUDY.

(E.) Black, W. C. (Washington U. Sch. Med., St. Louis, Mo.) and H. E. Haffner. *Cancer* 21(6):1080-1099, 1968.

A patient with chronic iron-deficiency anemia was shown to have multiple gastric filling defects which were ulcerated carcinoid tumors. The partial gastrectomy specimen contained innumerable carcinoids from diffuse hyperplasia of argyrophil cells. Histochemically and ultrastructurally, the hyperplastic and neoplastic cells were identical and closely resembled argyrophil cells from bronchial carcinoid tumors, and from normal human, mouse, and bat gastric mucosa. They appeared distinct from the corresponding cells of carcinoid tumors of the ileum. This finding is in agreement with reported differences in clinical and biochemical features of carcinoids arising from the foregut (bronchus and stomach) *vs.* carcinoids of midgut derivation (ileum appendix). More than one cell of origin for carcinoid tumors is suggested.

2058 SOME FACTORS WHICH INFLUENCE PROGNOSIS AFTER SURGERY FOR ADVANCED GASTRIC CANCER.

(E.) Maruta, K. (Shinshu U. Sch. Med., Matsumoto, Japan) and H. Shida. *Ann. Surg.* 167(3):313-318, 1968.

The type of operation, age distribution, localization, stage and histology of cancerous lesions, and serosal involvement were investigated as factors determining the prognosis of advanced gastric cancer in a study of 245 patients; a favorable prognosis was based on a 5-year post-surgery survival period. Macroscopic and microscopic studies of cancerous tissue revealed that gross serosal involvement was the most important factor influencing prognosis.

2059 GLOMUS TUMORS OF THE STOMACH.

(E.) Polikanova, R. B. (2nd Pirogov Moscow Med. Inst., USSR) and S. A. Cherniakevich. *Klin. Med.* 46(3):97-100, 1968.

2060 STOMACH CANCER IN BLOOD GROUPS A, B AND O. [ORAL COMMUNICATION; GASTROENT. SOC. PROVINCE NORD, JUNE 21, 1967.]

(Fr.) Combemale, B., C. Gautier-Benoit and Y. Delmas-Marsalet. *Presse Med.* 75(43):2192, 1967.

2061 METASTASIS FROM GASTRIC CANCER: AN AUTOPSY STUDY OF ALL CASES DYING DURING THE PAST 30 YEARS.

(It.) Gardini, G. F. (Malpighi Hosp., Bologna, Italy), R. Betti, A. Capelli and S. Castellari. *Minerva Med.* 58(79):3377-3378, 1967.

2062 ADRENAL CORTEX FUNCTION IN PATIENTS WITH AGASTRIC ASTHENIA (DUMPING SYNDROME).

(Rus.) Kuleshov, E. V. *Klin. Med.* 66(2):53-57, 1968.

2063 **SERUM AMINO ACID CONTENT IN ANACIDIC GASTRITIS.** *(Rus.)* Turianitsa, S. M. *Klin. Med.* 66(2):67-73, 1968.

2064 **DIAGNOSTIC IMPORTANCE OF THE ACID-BASE RATIO OF THE GASTRIC JUICE IN CHRONIC DISEASES OF THE STOMACH.** *(Rus.)* Dyskin, A. A., S. B. Zelenko, I. M. Martynova and V. A. Romanushko. *Klin. Med.* 66(2):73-76, 1968.

2065 **COMPARATIVE EVALUATION OF GASTRIC RESECTION METHODS IN THE LIGHT OF REMOTE RESULTS.** *(Rus.)* Zakharova, G. N. (Saratov Med. Inst., USSR), B. I. Nikiforov and V. N. Kats. *Khirurgiia* 44(2): 8-11, 1968.

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2073 **INTRA-ARTERIAL ADMINISTRATION OF CHEMOPREPARATIONS FOR GASTRIC CANCER.** *(Rus.)* Chernyi, V. A. (Kiev Inst. Post. Grad. Med. Studies, USSR). *Klin. Khirurgiia* (1):18-20, 1968.

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2080 **CROHN'S DISEASE OF THE STOMACH. REPORT OF TWO CASES.** *(E.)* Elibol, T. (Cleveland Clin., Ohio), G. B. Rankin and C. H. Brown. *Gastroint. Endosc.* 14(4):201-204, 1968.

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2088 **EARLY RECOGNITION OF GASTRIC CARCINOMA.** *(Ger.)* Krentz, K. (Hamburg-Eppendorf U. Hosp., Germany). *Med. Welt.* 19(19):1207-1212, 1968.

2089 **HEMATOPOIETIC FACTORS IN THE POSTGASTRECTOMY SYNDROME.** *(Rus.)* Iuldashev, U. I. (Tashkent Med. Inst., USSR) and Kh. D. Bekturdiev. *Med. Zh. Uzbek.* (12):45-48, 1967.

2090 **CHANGES IN GASTRIC MUCOSA AFTER USE OF SOME ANTIASTHMATIC AND ANALGESIC-ANTIPYRETIC DRUGS.** *(Ger.)* Drtil, J. (Health Dept., Valdice Prison, Jici, Czechoslovakia) and Z. Sanda. *Z. Ges. Inn. Med.* 23(8):236-240, 1968.

2091 **ON THE X-RAY PICTURE OF THE POSTOPERATIVE FUNCTIONAL DISTURBANCES AS A RESULT OF VARIATIONS OF OPERATION TECHNIQUE IN GASTRIC RESECTION AFTER BILLROTH II.** *(Ger.)* Orr, J. (Surg. Clin., Ernst Moritz Arndt U., Greifswald, Germany) and R. Reding. *Radiol. Diagn.* 9(1):19-22, 1968.

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2095 **RESULTS OF SURGERY FOR GASTRIC CANCER.** *(Sp.)* Salleras, V. (Our Lady of the Sacred Heart Hosp., Barcelona, Spain). *An. Med.* 53(2):183-189, 1967.

2096 **METASTASIZED GASTRIC CANCER IN THE SKIN AND TONSILS. (TWO CASES).** *(Rus.)* Miagkii, M. A. (Kirovograd Oblast' Cancer Clin., USSR). *Vop. Onkol.* 14(2):88-90, 1968.

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2098 **CLINICAL STUDY ON PADRIN AS PREMEDICATION FOR GASTRIC ENDOSCOPY.** *(Jap.)* Miyoshi, A. (Dept. Int. Med., Kyoto U., Japan), K. Asano, T. Konobu, T. Miyake, Y. Yamamoto, J. Ariyoshi, Y. Takahashi, T. Suzaki and K. Hajiro. *Jap. Arch. Intern. Med.* 15(2):43-46, 1968.

2099 **THE GASTRIC CAMERA IN DIAGNOSING STOMACH DISEASES.** *(It.)* Nava, G. (S. Eugenia Hosp., Rome, Italy). *Recent. Progr. Med. (Roma)* 43(5):467-489, 1967.

2100 **DYSPEPSIAS OTHER THAN ULCERS AND CANCER.** *(Fr.)* Debray, C. (Bichat. Hosp., Paris, France). *Conc. Med.* 90(15):3191-3194, 1968.

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2102 **ELECTROMYOGRAPHIC STUDIES OF THE STOMACH BEFORE AND AFTER VAGOTOMY.** *(Ger.)* Hegglin, J. (Zurich U. Surg. Clin., Switzerland), F. LaGriader and I. Babotai. *Helv. Chir. Acta* 35(1/2):274-283, 1968.

2103 **CHANGES IN THE STOMACH MUSCLE SIZE AFTER VAGOTOMY.** *(E.)* Bremner, C. G. (Gen. Hosp. Johannesburg, South Africa). *S. Afr. J. Surg.* 5(4):171-178, 1967.

2104 **GLOMUS TUMOR OF THE STOMACH.** *(E.)* Kleyn, K. A. (Sinai Hosp., Detroit, Mich.), G. H. Mandell, S. Sakwa and S. D. Kobernick. *Arch. Surg.* 97(1): 111-113, 1968.

2105 **BILIOUS VOMITING AFTER GASTRIC SURGERY: EXPERIENCE WITH A MODIFIED ROUX-Y LOOP FOR RELIEF.** *(E.)* Bartlett, M. K. (Massachusetts Gen. Hosp., Boston) and J. D. Burrington. *Arch. Surg.* 97(1):34-39, 1968.

2106 **DIAGNOSIS AND TREATMENT OF DUMPING SYNDROME FOLLOWING GASTRIC RESECTION.** *(Rus.)* Danovich, F. M. (Gen. Surg. Clin., Petrozavodsk U., USSR) and S. D. Bernik. *Klin. Khir.* (4):16-19, 1968.

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2107 GASTRIC INVOLVEMENT IN CROHN'S DISEASE. *(E.)* Cohen, W. S. (State U. Hosp., Iowa City, Iowa). *Amer. J. Roentgen.* 101(2):425-430, 1967.

2108 ROENTGENOLOGIC AND PATHOLOGIC ASPECTS OF SUPERFICIAL SPREADING CARCINOMA OF THE STOMACH. *(E.)* Bragg, D. G. (Cornell Med. Ctr., New York City), W. B. Seaman and R. Lattes. *Amer. J. Roentgen.* 101(2):437-446, 1967.

2109 ROENTGENOLOGIC DIAGNOSIS OF PYLORIC HYPERTROPHY IN ADULTS. *(E.)* Larson, L. J. (Mayo Clin., Rochester, Minn.), H. C. Carlson and M. B. Dockerty. *Amer. J. Roentgen.* 101(2):453-458, 1967.

2110 THE RETAINED GASTRIC ANTRUM: PRE-OPERATIVE ROENTGENOLOGIC DIAGNOSIS OF AN IATROGENIC SYNDROME. *(E.)* Burhenne, H. J. (Adult Med. Ctr., San Francisco, Calif.). *Amer. J. Roentgen.* 101(2):459-467, 1967.

2111 GASTRIC INFARCTION. *(E.)* Taylor, J. J. (Queen Elizabeth Hosp., Birmingham, England) and I. M. Thompson. *Brit. J. Surg.* 54(8):723-726, 1967.

2112 AVASCULAR GASTRIC NECROSIS. *(E.)* Yeo, R. (Kings Coll. Hosp., London, England). *Brit. J. Surg.* 54(8):707-709, 1967.

2113 THE GASTRIC INLET JET. *(E.)* Amory, H. I. (West Virginia U. Sch. Med., Morgantown). *Amer. J. Roentgen.* 101(2):450-452, 1967.

See also abstract nos.: 1704,1858,1924,2207,2407

114 ABNORMALITIES ASSOCIATED WITH NEONATAL DUODENAL OBSTRUCTION. *(E.)*
'oung, D. G. (Inst. Child Health, U. London, England) and
. W. Wilkinson. *Surgery* 63(5):832-836, 1968.

. review of the records of 157 infants with neonatal duodenal bstruction observed over a 15-yr period (1951-66) revealed at east one other abnormality in 70% of the 124 infants with ntrinsic obstruction (81 due to atresia, 24 with a diaphragm, nd 19 due to stenosis) compared to only 17% of the 33 in- nts with extrinsic obstruction (not counting malrotation hich was often the cause of the obstruction). The presenting gn was vomiting in 108 of those with intrinsic obstruction nd 32 of those with extrinsic obstruction, the vomit being bile ained in 88% of the latter but only 56% of the former. Four nfants were neither operated on nor autopsied, and 7 others ere not operated on; the operative mortality was 44%. As- ociated abnormalities included 50 cases of malrotation (26 ntrinsic and 24 extrinsic), 49 cases of severe jaundice (46 ntrinsic and 3 extrinsic), 33 cases of mongolism (all intrinsic), 1 cases of annular pancreas (31 intrinsic and 2 extrinsic), 9 cases of congenital heart disease (27 intrinsic and 2 extrin- ic), 17 cases of esophageal atresia (all intrinsic), 15 cases with mall bowel anomalies (12 intrinsic and 3 extrinsic), 7 cases vith large bowel anomalies (6 intrinsic and 1 extrinsic), 8 ases with central nervous system anomalies, 9 cases with keletal anomalies, and 8 cases with urinary tract anomalies. n view of the high incidence of associated anomalies, a full aparotomy is urged in all infants with neonatal duodenal ob- truction, and obstruction should be suspected in all cases of ersistent vomiting, regardless of the presence of bile.

115 A CLINICAL REVIEW OF 50 CASES OF DUODENAL DIVERTICULA. *(It.)* Petrassi, A.
Munic. Hosp., Cosenza, Italy), A. Castrignano and G. Cagnoni.
)sped. Ital. Chir. 18(1):1-17, 1968.

mong 50 patients (31 men and 19 women, 32-78 yr old) vith duodenal diverticula seen during the period 1960-67 representing 0.5% of 10,000 X-rays performed), the most ommon presenting symptom was abdominal pain: gastralgia fasting epigastric pain and hyperacidity) in 26 cases (10 of vhom also had melena), continuous or intermittent right ab- lominal pain and constipation in 10 cases, dyspepsia in 8 cases, and symptoms of gallbladder disease (colicky pain in the right hypochondrium with vomiting of bile and subicterus) in 6 cases. Associated duodenal ulcers were found in 8 cases, gallstones in 2 and carcinoma of the gallbladder in one. The most common sites were the 2nd and 3rd duodenal segments (16 and 15 cases, resp.), followed by the 1st and 4th segments (7 and 3 cases, resp.); 9 patients had multiple diverticula, and 1 of these also had diverticula of the jejunum while another had diverticula of the colon. Only one case (78-yr-old man) developed an acute abdomen due to perforation, and this was the only operative death. Symptomatic medical and dietetic therapy was given to 29 patients, either because of the mildness of their symptoms or because surgery was refused; 26 of these had a good result and 3 had a fair result. Twenty patients came to elective surgery. Except for one in whom exploratory laparotomy revealed carcinoma of the gallbladder with liver metastasis, all patients treated surgically had remissions; cures were obtained in all 10 treated by direct excision of the diverticula (plus cholecystectomy in 2 of 10) and in 7 of 9 treated by gastric resection; the other 2 treated by gastric resection showed good improvement. The incidence, classification, pathological anatomy, associated morbidity, etiology, symptoms, diagnosis, complications and treatment of duodenal diverticula are reviewed in detail (47 refs.). Direct excision is concluded to be the surgical treatment of choice, with gastric resection as a second choice if direct excision is impossible.

2116 MORPHOLOGICAL AND PROLIFERATIVE CHANGES IN TISSUES GENERATED FROM A DUODENAL GRAFT. *(E.)* Sjöstrand, J. (Dept. Histol., U. Gothenburg, Sweden) and C. G. Zetterlund. *Gastroenterology* 54(6):1129-1141, 1968.

The pattern of proliferation and differentiation in the newly formed epithelium and other tissues from a buried graft of rat duodenum was studied by means of ^{3}H-thymidine radioautography and histological staining techniques in 22 adult Sprague-Dawley rats. A pedicle graft about 2.5 cm long and 0.3 cm wide was prepared from duodenum just distal to the entry of the common duct and placed in a pocket prepared between the abdominal wall muscles to the right of the midline incision. Rats were sacrificed for histological studies 1-63 days after the implant, while others received 1-2 μC of ^{3}H-thymidine i.p. 45 min before sacrifice on the 2nd, 6th, 14th and 28th postoperative day for radioautography. The mucosa in the original graft retained its morphology and proliferative pattern and no loss of differentiation was observed that could be ascribed to its heterotopic location. A new mucosa also grew out from the graft to form a cystic or tube-like structure which was lined by the mucosa of the original graft and its epithelial outgrowths. In favorable cases, a completely epithelized tube developed within 5-7 weeks after the implant. Outgrowth of epithelium from the edge of the graft was observed from the 1st postoperative day. This early outgrowth seemed to be the result of migration of cells from the proliferative zones in marginal crypts of the strip, since no ^{3}H-thymidine labeled cells were seen in the outgrowing epithelium during this period. During the following weeks the epithelium extended further into the recipient area. After the 2nd week, the newly formed epithelium displayed 3 zones with different proliferative and morphological characteristics. A detailed tabulation of these characteristics reveals a gradual transition from a basophilic, flat-to-cuboidal epithelium in zone 1 to an acidophilic, tall-columnar epithelium with a distinct PAS-positive border (as in normal duodenum) in zone 3. The characteristics of the graft were consistently similar to those of the normal duodenum, except that the muscularis mucosa ended abruptly at the edge of the graft. Marked cell proliferation was seen in the new epithelium behind the most advanced cells, indicating that epithelial outgrowth after the 2nd week is caused mainly by proliferation of the new epithelium itself; the most advanced cells, however, were probably of migratory origin. In the region of the epithelial outgrowths next to the strip, crypts and villus-like structures could be recognized after the 2nd week. In this area, the surface and crypt epithelium acquired a morphology and proliferative pattern characteristic of normal duodenal mucosa. Outgrowth of muscle cells from the muscular coat of the graft was seen to accompany the process of epithelization.

2117 **GASTRIC EMPTYING AND PROPULSIVE INTESTINAL MOTILITY IN EXPERIMENTAL INTESTINAL OBSTRUCTION.** *(E.)* Nylander, G. (Dept. Experimental Surgery, Akademiska Sjukhuset, Uppsala, Sweden) and A. Svennson. *Acta Chir. Scand.* 134(2):135-145, 1968.

The effects of induced intestinal obstruction on gastric emptying and propulsive motility was studied in 338 Sprague-Dawley male rats. Both gastric emptying and the distal propagation of the evacuated portion in the small intestine were retarded 1 day after laparotomy. The effect on both these functions still persisted–although less marked–when 3 days had elapsed. Simple intestinal obstruction led after 1 day to marked retardation of the gastric emptying function; this was striking in comparison with both the intact and the solely laparotomized series. The distal propagation of the test dose in the obstructed small intestine was subject to corresponding retardation. When the intestinal obstruction had been present for 3 days the emptying of the stomach had not further been inhibited but had, instead, possibly been accelerated. On the other hand, the distal propagation of the evacuated portion was less marked.

2118 **ASSOCIATION OF PRIMARY NEOPLASMS OF THE SMALL INTESTINE WITH OTHER NEOPLASTIC GROWTHS.** *(E.)* Alexander, J. W. (U. Cincinnati Coll. Med., Ohio) and W. A. Altemeier. *Ann. Surg.* 167(6):958-964, 1968.

A review of 9721 consecutive autopsies to determine the incidence and types of primary tumors of the small intestine is presented. Of the 9721, 112 subjects (1.15%) had primary small intestine tumors, 7 (0.07%) of which were malignant. Of the 112, 83 (74%) had another independent neoplasm at the time of death, not limited to any particular organ. Of all benign tumors, 14% were multicentric in the small intestine. Associated independent neoplastic lesions occurred in 76% with small bowel tumors compared to 31% of those with primary neoplasms of all origins. The frequency of both concurrent malignant and concurrent benign tumors was greatest in the group with carcinoid tumors.

2119 **SMALL BOWEL HEMORRHAGE.** *(E.)* Netterville, R. E. (U. Mississippi Med. Ctr.), J. D. Hardy and R. S. Martin. *Ann. Surg.* 167(6):949-957, 1968.

The diagnostic procedures, operative management, and therapeutic results of 58 cases of small bowel hemorrhage are presented. Of the 58, 12 cases were due to benign tumors, 18 were due to malignant tumors, 14 were due to intussusception, and 7 were due to Meckel's diverticulum. Clinical, radiological and endoscopic studies are used to establish the diagnosis. The best single diagnostic procedure available is a detailed roentgen study of the small bowel. The principal deterrent to successful management lies in the difficulty in achieving timely and precise diagnosis before clinical damage has occurred. Laparotomies were performed on 51 patients without an operative fatality. Four patients stopped bleeding without operation and 3 expired without operative procedures being performed.

2120 **TUMORS OF THE SMALL BOWEL. COMPLETE REFLUX SMALL BOWEL EXAMINATION.** *(E.)* Miller, R. E. (Indiana U. Med. Ctr., Indianapolis) and R. L. Provines. *Amer. J. Gastroent.* 48(3):224-232, 1967.

The complete reflux small bowel examination in the demonstration of small bowel tumors (1 inflammatory fibroid polyp, 1 Peutz-Jeghers polyp, 1 metastases from unknown primary tumor), performed in 3 cases (2 men and 1 woman; 22-64 years old), illustrates the usefulness of the method to diagnose tumors of the small intestine. In each case, the lesion was not shown on the antegrade small bowel series or was shown to significantly better advantage by the reflux method. To date, no complications were noted in more than 125 patients subjected to complete reflux small bowel examination. The need of premedication with Demerol and atropine to facilitate the ease of examination is emphasized.

2121 **LIMITATION OF THE USE OF INERT GASES IN THE MEASUREMENT OF SMALL GUT MUCOSAL BLOOD FLOW.** *(E.)* Hamilton, J. D. (St. Bartholomew's Hosp., London, England), A. M. Dawson and J. Webb. *Gut* 8(5):509-521, 1967.

The removal rate of ^{133}Xe from isotonic fluid in closed loops of the small intestine was measured in 19 mongrel and greyhound dogs, weighing 8-30 kg, to determine mucosal blood flow. The values calculated from the xenon disappearance rates were much lower than those obtained by other methods. Initial experiments suggested that ^{133}Xe disappearance was blood flow-dependent because the disappearance rate was mono-exponential and because after temporary occlusion of the artery supplying the loop, there was a period of rapid Xe removal that corresponded to the period of active hyperemia. No correlation was obtained between the Xe removal rate and the total small gut blood flow measure by collecting venous effluent. The limiting factors of this method are as follows: the method can only measure villous blood flow because the lumen fluid has no access to the crypts; the Xe diffusion rate through the villous epithelial cell would not be rate limiting over the range of blood flow which might be observed; and due to the continuous contraction and relaxation of the tightly packed villi in the dog, lumen fluid has only intermittent access to varying portions of individual villi, and, therefore, to only a corresponding proportion of their blood flow.

2122 **FECAL ^{14}C-BILE ACID EXCRETION IN NORMAL SUBJECTS AND PATIENTS WITH STEROID-WASTING SYNDROMES SECONDARY TO ILEAL DYSFUNCTION.** *(E.)* Stanley, M. M. (U. Illinois Coll. Med., Urbana) and B. Nemchausky. *J. Lab. Clin. Med.* 70:627-639, 1967.

Four patients, ages 20-62 years, with either active distal ileitis, ileal resection, or recurrent ileitis after ileal resection and 16 subjects, ages 4-51 years, with normal ileal function were infused i.v. with 5 μg or 30 μg of carboxyl ^{14}C sodium cholate in sterile normal saline solution and given chronium sesquioxide (Cr_2O_3) as a nonabsorbable indicator; complete stool specimens were collected from each. The mean half-life of the tracer in the 16 normal subjects was 7.4 days, with a daily fractional excretion rate of 0.12; the excretion rate of the 4 youngest subjects (ages 4-9 years) was similar to that of the rest of the group. Labeled cholate excretion was extremely rapid in the patients with ileal dysfunction; the mean half-life was 1.06 days, with a daily fractional excretion rate of 0.75. Conjugated bile acid absorption, the only known specific function of the distal ileum, may be estimated in normal subjects by this method.

2123 HEMANGIOMA OF THE SMALL INTESTINE. *(E.)* Bilton, J. L. (Huron Road Hosp., Cleveland, Ohio) and M. Riahi. *Amer. J. Gastroent.* 48(2):120-124, 1967.

A emergency case of unexplained rectal bleeding was observed in a 52-year old male patient; the patient was pale, cold and sweating and had a 5.5 mg/100 cc hemoglobin level and a blood pressure of 100/65. Multiple blood transfusions failed to elevate the low hemoglobin. A preoperative diagnosis of Meckel's diverticulum or diverticulum of the colon was made before laparotomy revealed the presence of a 8 mm lesion of the antimesenteric surface of the bowel; enterostomy revealed a small hemangioma of the bowel with a small blood vessel projecting into the lumen and bleeding actively. Wedge resection was done and no further pathology except cholelithiasis was found. A severe postoperative edema of the face and conjunctiva was attributed to blood transfusions and did not constitute a surgical complication. The patient was discharged in good condition 13 days after admission and has remained asymptomatic.

2124 A SIMPLE TECHNIC FOR TREATING CIRCUMILEOSTOMY SKIN ULCERATIONS. *(E.)* Sommer, R. G. (Dartmouth Med. Sch., Hanover, New Hampshire) and O. F. Jillson. *Amer. J. Gastroent.* 48(2):135-136, 1967.

A simple inexpensive device to facilitate healing of circumileostomy skin ulcerations is described. The apparatus consists of a padded improvised frame with a 10-inch square window under which is placed a shallow basin for collecting drainage while the patient sleeps. The patient, 23-year-old female, showed dramatic improvement without ileostomy appliance or dressing. Complete healing soon occurred. Minor skin ulcerations still appear occasionally, but when the patient resumes the use of the frame during sleeping, she is able to lead a productive life.

2125 CHANGES IN THE MOTILITY OF THE SMALL INTESTINE IN DIGESTIVE DISORDERS. *(E.)* Pirk, F. (Inst. Human Nutr., Prague, Czechoslovakia). *Gut* 8(5):486-490, 1967.

The rate of gastric emptying, the time taken by contrast medium to reach aboral ileum, the time of ileostasis, and the time taken by the medium to reach the caecum were evaluated in 212 healthy subjects, gastrectomy patients with and without achlorhydria, nonoperative achlorhydria patients, pancreatic hyposecretion patients and post-cholecystectomy patients by X-ray examination. The lack of digestive juice is compensated for by a slowing down of the passage rate through the small intestine and a longer ileostasis; this is observable even during the passage of an indifferent substance when digestion does not occur. The rate of passage is influenced by gastric emptying, but the duration of ileostasis is not.

2126 *IN VIVO* EFFECT OF POTASSIUM ON SMALL BOWEL. *(E.)* Myers, R. N. (Lankenau Hosp., Philadelphia, Pa.), C. E. Brown and J. M. Deaver. *Ann. Surg.* 166(1):693-703, 1967.

The effects of potassium chloride on human bowel mucosa were studied in 20 patients undergoing elective small or large bowel resection for neoplastic disease; 2-3 inch bowel segments with intact blood supplies were isolated at the start of resection. Hypertonic 7% potassium chloride, hypertonic 5% sodium chloride, and isotonic 0.9% sodium chloride were injected intraluminally into the isolated bowel loops; exposure time ranged between 30 and 85 minutes. The potassium-exposed segments became thickened, edematous, and took on a purplish hue; a thick stringy mucus covered the mucous membrane. Hypertonic sodium caused similar changes but to a lesser degree. Effects were more striking in the small bowel; the most severe changes occurred in the mucosa. An early irritative effect was indicated by mucus hypersecretion, capillary and vein dilatation and congestion in all layers, and shrinkage of muscle nuclei and nerve plexus ganglion cells. Red cells were shrunken and pyknotic, suggesting salt diffusion through vessel walls. It is not conclusive from this study whether the damage is due to direct ionic toxicity, hyperosmolarity, or both. Further investigations to clarify these parameters is currently in progress.

2127 SURVIVAL OF SMALL INTESTINE FOLLOWING EXCISION, PERFUSION AND AUTOTRANSPLANTATION. *(E.)* Iijima, K. (Presbyterian Hosp., New York City) and R. A. Salerno. *Ann. Surg.* 166(1):968-975, 1967.

The viability of excised, perfused small and large bowel segments was investigated in dogs as the final test of a perfusion system for *in vitro* organ studies. The perfusate, consisting of heparinized, fresh autologous blood and Ringer's solution maintained viability of sigmoid colon segments after 5 hours perfusion; attempts to transplant the segments proved impractical due to the extremely small calibre and fragility of the inferior mesenteric artery and vein.. A better success was attained with small bowel transplants, which were also viable after perfusion and whose vessels were large enough for vascular anastomosis. There was a high incidence of postoperative diarrhea, and a high death rate; death was attributable primarily to thrombosis of the superior mesenteric artery at the anastomotic site. Experiments were performed to establish the dosage regimen for postoperative anticoagulation to prevent thrombosis; 2.5 mg of coumadin per day, followed by a daily maintenance dose of 1.0-1.25 mg, proved satisfactory in 18-23 kg dogs. Other improvements included maintaining fluid and electrolyte balances in experimental animals and changing the pH and eventually the composition of the perfusates; these changes increased the survival rates after transplantation. One animal is still alive 3 months and another, 6 months following perfusion-transplantation. These experiments establish the perfusion method as an effective means of maintaining viability of excised intestinal segments.

2128 ACUTE ABDOMINAL WALL HERNIAS IN INFANTS AND CHILDREN. *(E.)* Golby, M. (United Birmingham Hosps., England). *Amer. J. Surg.* 114(12): 888-893, 1967.

The results of a three-year survey of 400 children with acute signs and symptoms of inguinal and umbilical hernia are presented. Hernia incarceration is usually secondary to acute respiratory or gastrointestinal infections. Ninety percent of the patients under 5 years of age responded to conservative treatment for inguinal hernia reduction. A case history outline of 20 premature infants with strangulated hernia are presented; the histories of 20 older patients, premature at birth are also outlined. True strangulation occurs rarely and is often impossible to differentiate clinically from simple incarceration; strangulated hernias do not respond to conservative treatment; surgical intervention is the preferred treatment.

2129 SOME RECENT ADVANCES IN SMALL INTESTINE PHYSIOLOGY. *(E.)* Goulston, K. (Roy. Prince Alfred Hosp., Sydney, Australia). *Bull. Postgrad. Comm. Med. (Sydney)* 23(12):366-369, 1968.

Research in recent years has demonstrated the existence of an enteric surface coat, a layer of fine filaments radiating from the plasma membrane; it offers an effective barrier to bacteria, desquamated cells, and food, but its exact physiological functions are unknown. The active and passive absorption of water has been investigated; evidence suggesting that water leaves the intestinal cell laterally into the intercellular spaces has been presented by light and electron microscopy studies. Intestinal active transport of glucose was shown to be sodium-dependent; if luminal glucose concentrations are higher than blood levels (after meals), then sodium does not effect glucose absorption. The rise in plasma insulin after oral glucose administration is thought to be hormone-dependent, but the identity of the hormone remains unknown. Except for their surface areas, there are no histological differences between jejunum and ileum. The possibility of a differential absorptive function for chloride and bicarbonate between jejunal and ileal mucosa has been proposed by recent studies showing a reciprocal relationship between the two electrolytes half way down the small intestine. Attempts to understand small intestine function at different bowel levels and with regard to its relation to whole body function are now being made.

2130 EXPERIMENTAL NONOCCLUSIVE MESENTERIC ISCHEMIA: THERAPEUTIC OBSERVATIONS. *(E.)* Williams, L. F. (Boston U. Sch. Med., Mass.), L. F. Anastasia, C. A. Hasuitis, M. A. Bosniak and J. J. Byrne. *Amer. J. Surg.* 115(1):82-88, 1968.

Intestinal ischemia was produced by a 2-hr occlusion of the superior mesenteric artery in adult mongrel dogs; this was associated with decreased cardiac output. The release of the occlusion simulates the clinical problem of nonocclusive mesenteric ischemia. The therapeutic agents given were phenoxybenzamine and isoproterenol. Therapy that includes volume replacement or support of cardiac output does not improve the survival rates. Phenoxybenzamine improved survival and eliminated hemorrhagic enteritis.

2131 CARCINOMA OF THE DUODENUM. [FOUR CASES] *(E.)* Kreel, L. (Roy. Free Hosp., London, England) and C. Mackintosh. *Gut* 9(2):222-226, 1968.

2132 HODGKIN'S DISEASE OF THE SMALL INTESTINE CAUSING DIARRHEA. [CASE REPORT] *(Fr.)* Bernier, J. J. (I.N.S.E.R.M., St. Lazare Hosp., Paris, France), D. Christol, V. Vic-Dupont, Y. Geffroy, J. C. Rambaud, C. Bognel and A. Prost. *Presse Med.* 75(45): 2255-2259, 1967.

2133 EXTENSIVE INTESTINAL RESECTION IN THE PEUTZ-JEGHERS SYNDROME. [CASE REPORT] *(It.)* Ruffo, A. (Inst. Spec. Surg. Path., U. Ferrara, Italy) and G. Azzena. *Minerva Med.* 58(102):4689-4696, 1967.

2134 REPOPULATION OF PEYER'S PATCHES IN MICE. *(E.)* Evans, E. P. (MRC Radiobiol. Unit, Harwell, Berkshire, England), D. A. Ogden, C. E. Ford and H. S. Micklem. *Nature* 216(5110):36-38, 1967.

2135 ETIOLOGY, PATHOGENESIS, CLINICAL ASPECTS AND TREATMENT OF INTESTINAL PHLEGMONS. *(Rus.)* Apanasenko, B. G. (S. M. Kirov Mil. Med. Acad., Leningrad, USSR), S. I. Smirnov and S. V. Dergachev. *Klin. Khirurgiia* (1):26-30, 1968.

2136 PERITONITIS FROM NITROGEN-MUSTARD-INDUCED RUPTURE OF METASTASIS IN THE WALL OF THE ILEUM. *(E.)* Greenberg, H. B. (Tulane Univ. Sch. Med., New Orleans, La.). *Amer. J. Gastroenterology* 49(3):251-254, 1968.

2137 INTRAMURAL SMALL INTESTINAL HEMATOMA. A REVIEW AND A REPORT OF A NEW CAUSE: UREMIA. *(Rev.)(E.)* Kolodny, M. (Cornell Univ. Med. Coll., New York), A. I. Mushlin, W. G. Baker, Jr., M. H. Sleisenger and R. L. Nachman. *Arch. Intern. Med.* 121:438-445, 1968.

2138 SMALL-INTESTINAL DIARRHOEA. *(E.)* Tansy, M. F. (Temple U. Sch. Dent. Pharm., Philadelphia, Pa.) and V. S. Venturella. *Lancet* 2(7529):1314-1315, 1967.

2139 HYPERPLASIA OF BRUNNER'S GLANDS OF THE DUODENUM. *(Rev.)(E.)* Kaplan, E. L. (U. Pennsylvania Sch. Med., Philadelphia), W. L. Dyson and W. T. Fitts, Jr. *Surg. Gynec. Obstet.* 126(2):371-375, 1968.

2140 CHOLELITHIASIS OBSTRUCTIONS OF THE SMALL INTESTINE. *(Rus.)* Kasaikina, T. N. (I. M. Sechenov 1st Moscow Med. Inst., USSR) and V. A. Oranskii. *Ter. Arkh.*

2141 SURGICAL TREATMENT OF HAEMATEMESIS AND DUODENAL PERFORATION FOLLOWING BRAIN SURGERY IN A CHILD. *(E.)* Ross, R. M. (Roy. Hosp. Sick Children, Glasgow, Scotland) and W. M. Dennison. *Z. Kinderchir.* 5(3/4):380-383, 1968.

142 **THE ILEOCOLONIC JUNCTION: AN INACCESSIBLE "SPHINCTERIC ZONE."** *(Rev.)(E.)* elley, M. L. Jr. (Hitchcock Clin. & Dartmouth Med. Sch., anover, New Hampshire). *Gastroenterology* 53(5):811-812, 967.

143 **JEJUNAL DIVERTICULA IN THE PRESENCE OF SMALL-BOWEL-OBSTRUCTION.** *(E.)* into, D. J. (Iswich and East Suffolk Hosp.) *Brit. J. Surg.* 5(4):264-265, 1968.

144 **PROTECTIVE FILM IN THE MANAGEMENT OF AN ILEOSTOMY.** *(E.)* Robinson, K. P. Dept. Surg., Westminster Hosp.) *Brit. J. Clin. Pract.* 22(5): 95-197, 1968.

145 **CARCINOMA OF THE DUODENUM.** *(E.)* Devlin, H. B. (St. Thomas's Hosp., London, ngland), A. S. Y. Platten and B. Corrin. *Brit. J. Surg.* 55(4): 91-294, 1968.

146 **EXTENSIVE SMALL BOWEL RESECTION WITH FORMATION OF OBSTRUCTION TO MECKEL'S IVERTICULUM (CASE).** *(Rus.)* Abdvzhalilov, A. A. Galliaaral Dist. Hosp., Samarkand, USSR). *Med. Zh. Uzbek.* 12):63, 1967.

147 **FEMORAL HERNIA--A BRIEF REVIEW.** *(E.)* Boyd, C. E. (Shreveport, La.). *J. Abdom. Surg.* 0(6):145-148, 1968.

148 **INTRADUODENAL DIVERTICULA.** *(Ger.)* Sailer, R. (Surg. Clinic, U. Bochum, Essen, ermany). *Munchen. Med. Wschr.* 110(17):1062-1065, 1968.

149 **A CASE OF DUODENORENAL FISTULA.** *(Cz.)* Bohutova, J. (Surg. Clin. Med. Fac. Charles J., Prague, Czechoslovakia). *Cesk. Radiol.* 22(2):86-89, 1968.

150 **JEJUNO-JEJUNAL INTUSSUSCEPTION FOLLOWING SUBTOTAL GASTRIC RESECTION.** *(E.)* rust, F. W. (Harper Hosp., Detroit, Mich.), F. Eskandari and . Guarnaccia. *Harper Hosp. Bull.* 26(2):56-59, 1968.

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2152 **THE REPAIR OF LARGE OR DIFFICULT HERNIAS WITH MATTRESSED ONLAY GRAFTS OF FASCIA LATA: A 21-YEAR EXPERIENCE.** *(E.)* Hamilton, J. E. (VA Hosp., Louisville, Ky.). *Ann. Surg.* 167(1):85-90, 1968.

2153 **ARGENTAFFIN TUMOURS OF THE APPENDIX.** *(E.)* Miller, S. E. P. (West. Infirm., Glasgow, Scotland) and I. F. Kerr. *Brit. J. Surg.* 54(9):781-783, 1967.

2154 **ARGENTAFFIN TUMOURS OF THE SMALL BOWEL.** *(E.)* Kerr, I. F. (West. Infirm., Glasgow, Scotland), D. B. Brown and S. E. P. Miller. *Brit. J. Surg.* 54(9):786-788, 1967.

2155 **DUODENAL AND INTESTINAL METASTASES OF A CUTANEOUS NEVUS CARCINOMA.** *(Fr.)* DeWitte, C. (Schaerbeck Hosp., Brussels, Belgium), A. Dony and F. Hirsch. *Acta Gastroent. Belg.* 31(2):168-174, 1968.

2156 **CONGENITAL ABNORMALITIES OF THE SMALL BOWEL.** *(E.)* Moseley, J. E. (Mt. Sinai Hosp., New York City) and J. G. Rabinowitz. *J Mount Sinai Hosp. N. Y.* 35(1):14-51, 1968.

2157 **INTESTINAL SECRETION AND ENZYME ACTIVITY OF THE SUCCUS ENTERICUS AND BLOOD OF DOGS AFTER RESECTION OF THE SMALL INTESTINE.** *(Rus.)* Kolesnikov, Iu. N. (Crimean Med. Inst., Simferopol, USSR) and V. A. Protsenko. *Biull. Eksper. Biol. Med.* 65(5):47-49, 1968.

2158 **THE EFFECT OF RADIATION ON ^{47}Ca, ^{85}Sr, AND MUCOPOLYSACCHARIDE METABOLISM IN THE RAT INTESTINE.** *(E.)* Glaubitt, D. (Eppendorf U. Hosp., Hamburg, Germany). [Pp. 452-461 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2159 **THE ROLE OF INTESTINAL INJURY IN 30-DAY RADIATION LETHALITY OF WEANLING MICE.** *(E.)* Fred, S. S. (Natl. Cancer Inst., Natl. Inst. Health, Bethesda, Md.), S. M. Wilson and W. W. Smith. [Pp. 413-420 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2160 **THE ROLE OF THE INTESTINE IN ACUTE POSTIRRADIATION MORTALITY IN MICE.** *(E.)* Vatistas, S. (St. Bartholomew's Hosp. Med. Coll., London, England), A. Herdan and R. E. Ellis. [Pp. 433-443 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966, M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2161 **LYSOSOME ACTIVITY IN RADIATION INDUCED INTESTINAL INJURY.** *(E.)* McFayden, D. M. (Biol. Dept., Brookhaven Natl. Lab., Upton, N. Y.) and D. G. Baker. [Pp. 401-412 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2162 GUT LEAKAGE AND INTESTINAL DEATH AS A MEASURE OF RADIATION DAMAGE: RBE VALUES FOR NEUTRONS AND THE EFFECTS OF FRACTIONATION. *(E.)* Hornsey, S. (Hammersmith Hosp., London, England) and S. Vatistas. [Pp. 396-400 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2163 FINE STRUCTURE OF THE INTESTINAL EPITHELIUM AFTER 3 KRADS OF X-RAYS. *(E.)* Hampton, J. C. (Northwestern U. Med. Sch., Chicago, Ill.). [Pp. 13-26 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2164 AUTORADIOGRAPHIC STUDIES OF THE ENTERIC SURFACE COAT. *(E.)* Ito, S. (Harvard Med. Sch., Boston, Mass.) and J. P. Revel. [Pp. 27-41 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2165 THE EFFECT OF BILE ON THE MUCOSA OF THE SMALL INTESTINE. *(E.)* Mahony, T. D. (Biol. Dept., Battelle Mem. Inst., Richland, Wash.), J. D. Berlin, J. C. Pekas and M. F. Sullivan. [Pp. 42-56 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2166 THE EFFECTS OF X-RAY THERAPY ON THE MORPHOLOGY OF THE MUCOSA OF THE HUMAN SMALL INTESTINE. *(E.)* Trier, J. S. (VA Hosp., Madison, Wisc.), T. H. Browning and T. H. Foroozan. [Pp. 57-72 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2167 CYTOLOGIC CHANGES IN THE INTESTINE AFTER RADIATION PROTECTION. *(E.)* Braun, H. (Freiburg U. Inst. Radiol., Breisgau, Germany). [Pp. 94-100 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2168 EFFECTS OF SINGLE-DOSE WHOLE-BODY IRRADIATION ON THE MOUSE DUODENAL CRYPT CELLS. *(E.)* Lesher, S. (Div. Bio. Med. Res., Argonne Natl. Lab., Ill.). [Pp. 103-110 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2169 SOME ASPECTS OF THE PHYSIOLOGY OF INTESTINAL ABSORPTION. *(E.)* Wasserman, R. H. (New York State Veter. Coll., Cornell U., Ithaca). [Pp. 177-194 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2170 SODIUM, WATER AND B_{12} ABSORPTION IN IRRADIATED RATS: INFLUENCE OF BILE. *(E.)* Sullivan, M. F. (Biol. Dept., Battelle Mem. Inst., Richland, Wash.). [Pp. 216-227 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2171 EFFECTS OF RADIATION AND DIARRHOEA ON INTESTINAL ABSORPTION OF VITAMIN B_{12}. *(E.)* Okuda, H. (Kurume U. Sch. Med., Japan) and M. Fujii. [Pp. 228-241 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2172 *IN VIVO* FAT ABSORPTION BY THE SMALL INTESTINE OF X-IRRADIATED MICE. *(E.)* Maisin, J. R. (Radiobiol. Dept., Ctr. Nucl. Energy Studies, Mol, Belgium), J. Dulcino and J. Deroo. [Pp. 251-260 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2173 SEROTONIN AND RADIATION EFFECTS ON INTESTINE. *(E.)* Matsuoka, O. (Natl. Inst. Radiol. Sci., Anagawa, Chiba, Japan), T. Tsuchiya, M. Kashima and H. Eto. [Pp. 313-326 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2174 A COMPARISON OF DAMAGE TO THE SMALL INTESTINE BY FISSION NEUTRONS OR GAMMA RAYS FROM ^{60}Co. *(E.)* Vogel, H. H., Jr. (Div. Bio. Med. Res., Argonne Natl. Lab., Ill.) and D. L. Jordan [Pp. 327-330 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2175 EARLY EFFECTS OF 14.1 MeV NEUTRON IRRADIATION ON INTESTINAL MUCOSA. *(E.)* Hirose, F. (Res. Inst. Nucl. Med. & Biol., Hiroshima U., Japan). [Pp. 331-341 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2176 ACUTE INTESTINAL RADIATION DEATH IN THE GUINEA PIG. *(E.)* Willhoit, D. G. (Dept. Environ. Sci. & Eng., U. North Carolina, Chapel Hill). [Pp. 342-349 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2177 PANEL DISCUSSION: MECHANISM OF INTESTINAL RADIATION DEATH. *(E.)* Bond, V. P. (Brookhaven Natl. Lab., Upton, N. Y.), J. W. Osborne, S. Lesher, C. C. Lushbaugh and S. Hornsey. [Pp. 351-373 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2178 *NECTURUS MACULOSUS* AS AN EXPERIMENTAL ANIMAL TO STUDY CELLULAR INJURIES OF THE IRRADIATED GUT *IN VIVO*. *(E.)* Prasad, K. N. (Med. Res. Ctr., Brookhaven Natl. Lab., Upton, N. Y.). [Pp. 377-384 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2179 INTESTINAL VASCULAR CHANGES IN THE ACUTE RADIATION INTESTINAL SYNDROME. *(E.)* Eddy, H. A. (Dept. Radiation Biol. & Biophysics, U. Rochester, N. Y.) and G. W. Casarett. [Pp. 385-395 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2180 THE "BILIOUS STOOL" SYMPTOM FOLLOWING APPENDECTOMY. *(Rus.)* Shul'tsev, G. P. (Cent. Inst. Postgrad. Med. Study, Moscow, USSR). *Klin. Med. (Moskva)* 46(4):128-131, 1968.

2181 PRETREATMENT WITH "METOCLOPRAMIDE" FOR DUODENAL INTUBATION. PERSONAL OBSERVATIONS ON 200 CASES. *(It.)* Jori, G. P. *Gazz. Int. Med. Chir.* 73(6):525-530, 1968.

2182 CLINICO-RADIOLOGIC CONTRIBUTION TO THE KNOWLEDGE OF SPONTANEOUS BILIODIGESTIVE FISTULAE AND OF THEIR SERIOUS COMPLICATIONS: BILIARY ILEUS. *(It.)* Gonnelli, P., R. Tilli and A. Origone. *Friuli Med.* 22(5):1179-1208, 1967.

2183 ON PRIMITIVE MALIGNANT EPITHELIAL TUMORS OF THE VERMIFORM APPENDIX. *(It.)* Pugliese, F. *Arch. Ital. Pat. Clin. Tumori* 10(3/4): 293-316, 1967.

2184 CONSIDERATION OF A CASE OF MALIGNANT LEIOMYOMA OF THE ILEUM. *(It.)* De Gaetani Ferrari, C. *Arch. Ital. Pat. Clin. Tumori* 10(3/4):261-280, 1967.

2185 INTESTINAL STRANGULATION THROUGH AN APERTURE IN THE FALCIFORM LIGAMENT. *(E.)* Blunt, A. and G. F. Rich. *Aust. Zeal. J. Surg.* 37(3): 310, 1968.

2186 PRESENTATION OF MIDGUT MALROTATION IN ADULTS. *(E.)* Devlin, H. B., R. S. Williams and J. W. Pierce. *Brit. Med. J.* 121(4):803-806, 1968.

2187 NEURAL AND HORMONAL INFLUENCES OF PERITONITIS ON PARALYTIC ILEUS. *(E.)* Landman, M. D. (UCLA Sch. Med., Los Angeles, Calif.) and W. P. Longmire. *Amer. Surg.* 33(10):756-762, 1967.

2188 THE EFFECTS OF LOW MOLECULAR DEXTRAN UPON ISCHAEMIC ROUX-EN-Y INTESTINAL LOOPS. *(E.)* Flannery, B. (Westminster Hosp., London, England) and C. W. Venables. *Brit. J. Surg.* 55(2): 95-98, 1968.

2189 INTUSSUSCEPTION OF A CALCIFIED MUCOCELE OF THE APPENDIX. *(E.)* Bridger, G. P. (North Middlesex Hosp., London, England). *Brit. J. Surg.* 55(2):146-147, 1968.

2190 JEJUNAL DIVERTICULA IN THE PRESENCE OF SMALL-BOWEL OBSTRUCTION. *(E.)* Pinto, D. J. (Ipswich and East Suffolk Hosp., England). *Brit. J. Surg.* 55(4):264-265, 1968.

2191 CARCINOMA OF THE DUODENUM. *(E.)* Devlin, H. B. (St. Thomas's Hosp., London, England), A. S. Y. Platten and B. Corrin. *Brit. J. Surg.* 55(4): 291-295, 1968.

2192 A COMPLICATED AORTODUODENAL FISTULA: A CASE REPORT. *(E.)* Eadie, D. G. A. (London Hosp., England) and D. J. Pollock. *Brit. J. Surg.* 55(4):314-317, 1968.

2193 OBSERVATIONS ON INTRACRISTAL INCLUSIONS IN THE MITOCHONDRIA OF EPITHELIAL CELLS OF THE SMALL INTESTINE OF MICE AFTER APPLICATION OF ACTINOMYCIN-C. *(Ger.)* Linss, W., K. D. Waldmann and G. Geyer. *Exp. Path.* 2(1):70-77, 1968.

See also abstract nos.: 1876,1923

2194 APPRAISAL OF THE LONG-TERM RESULTS OF VAGOTOMY AND PYLOROPLASTY IN 100 PATIENTS WITH BLEEDING DUODENAL ULCER.

(E.) Farris, J. M. (Dept. Surg., U. California, Irvine) and G. K. Smith. *Ann. Surg.* 166(4):630-639, 1967.

A long-term (average follow-up 7.42 yr) appraisal is presented of 100 patients with bleeding ulcers who were treated by vagotomy and pyloroplasty. Among 57 with clinical evidence of massive bleeding, mortality was 7%. There were no operative deaths among 43 operated upon because of prominent bleeding. Five of the patients in the "massive" group required a second operation and 8 experienced further bleeding. These poor results are believed to be due to a poorly emptying pyloroplasty rather than to an incomplete vagotomy. In a questionnaire, all patients were given the opportunity of self-evaluation. Six of 94 patients indicated less than complete satisfaction with the operation, usually because of dumping and diarrhea or a combination of both.

2195 THE LONG-TERM COURSE OF GASTRODUODENAL ULCERS: STATISTICS ON 421 PATIENTS WITH A FOLLOW-UP OF MORE THAN 10 YEARS.

(Fr.) Levrat, M. (Lyon, France), L. Descos, J. Pasquier and R. Lambert. *Arch. Mal. Appar. Dig.* 57(2):141-152, 1968.

Among 1042 patients first treated for gastric or duodenal ulcers between 1943 and 1956, 243 responded to a mailed questionnaire, 119 others were reexamined, and 59 were known to have died of their ulcer during the first 10 years, resulting in a group of 421 patients (321 males and 100 females; 272 treated in the hospital and 149 treated as private outpatients) who were followed for periods of 10-24 yr. At the time of initial treatment, ulcers had been present for an average of 9 yr, and 181 patients (including 67 of 139 with gastric ulcer and 83 of 213 with duodenal ulcer) had a variety of complications: bleeding in 147 cases, stenosis in 28, and perforation in 19. The 204 patients who were treated surgically (97 by gastrectomy, 14 by gastroenterostomy (plus vagotomy in 3 of 14), 7 by simple suture, and 86 by unknown procedures) included 102 with duodenal ulcer, 68 with gastric ulcer, 5 with pyloric ulcer, 23 with multiple ulcers, and 6 with ulcers of unknown site, 43.6% of which had been present for more than 10 yr. There were 121 cures, 14 patients improved, 28 were unchanged, and 41 died (including 29 of 167 males and 12 of 37 females). Of the 41 deaths, 39 were immediately postoperative and 67% were due to infectious complications in the era before antibiotics and when anesthetic procedures had not yet been perfected; the higher death rate in females is ascribed to a significantly longer average duration of ulcer symptoms before treatment. The 217 patients who were treated medically (rest and diet plus atropine or anticholinergic agents, bismuth and alkalies) included 111 with duodenal ulcer, 71 with gastric ulcer, 7 with pyloric ulcer, 11 with multiple ulcers and 17 with ulcers of unknown site. There were 83 cures (with a follow-up period after the cure of 1-9 yr in 30 cases and over 10 yr in 44 cases), 38 patients were improved, 75 were unchanged, and 21 died (including 15 of 154 males and 6 of 63 females). The deaths were due to hemorrhage in 14 cases, perforation in 4 and stenosis in 3. Eleven of the patients who died were over 70 yr old. The patients who were cured by medical treatment thus accounted for 19.7% of the entire group, while 38.2% of the entire group received some benefit from medical treatment. It is emphasized that each case represents an individual problem and that it is practically impossible to predict the response of an individual ulcer patient to medical therapy. A response to medical treatment seems to be favored, however, by a later onset of the ulcer, the absence of a family history of ulcer, the absence of bleeding, and a gastric rather than a duodenal site. In general, surgery is highly recommended in the treatment of peptic ulcer, since the cure rate is higher and since the rather high operative mortality reported for this group of patients has now been greatly reduced by improved techniques.

2196 PHENYLBUTAZONE AND HISTAMINE FORMATION IN RAT GLANDULAR STOMACH: ITS RELATIONSHIP TO GASTRIC ULCERATION.

(E.) Abdel-Galil, A. A. M. (Dept. Pharmacol., U. Dundee, Scotland) and P. B. Marshall. *Brit. J. Pharmacol.* 33(1):1-14, 1968.

In fasted female Wistar rats, single injections of phenylbutazone (100-200 mg/kg i.m.) produced a dose-related increase in urinary histamine excretion, although repeated injections of 50 mg/kg/day for 15 days had no significant effect. Following a single injection of 200 mg/kg i.m. in normal rats, the histamine-forming capacity in the glandular stomach was increased by 9.9-235% compared to that in saline-treated controls and ulcers were found in 16.7-83.3% of the rats sacrificed at intervals for 1-24 hr; the maximum effect was produced in 6 hr with an ulceration index of 249.9. Histamine formation in the gastric mucosa was also increased by KB-95 [2-(N′-methyl-piperid-4′-yl)-4-benzyl-5-phenyl-3-oxo-pyrazoline], which did not produce any ulcers, and by sodium salicylate (5 g%) which yielded a maximum ulceration index of 50. Control studies showed that these drugs have no effect on the histamine content of the gastric mucosa *in vitro*. The ulcerogenic effect of phenylbutazone (but not usually the effect on histamine formation) was potentiated by fasting, adrenalectomy (ulceration index of 300 after adrenalectomy and 66.7 after a sham operation), hypophysectomy (ulceration index of 260 after thyroidectomy and 192 after a sham operation, the difference between which is not statistically significant), or the combined operations of adrenalectomy + thyroidectomy or thyroidectomy + vagotomy. Vagotomy alone decreased the ulcerogenic effect of phenylbutazone in normal rats (ulceration index of 66.7 after vagotomy and 233.3 after a sham operation) or adrenalectomized rats, but not in thyroidectomized rats. Thyroidectomy alone had little effect on the ulcerogenic properties of phenylbutazone. It is concluded that phenylbutazone has a two-pronged effect on the gastric mucosa: on the one hand, its effect on histamine formation suggests that it stimulates or potentiates aggressive factors in ulcerogenesis such as the acid-pepsin factor, while on the other hand it seems to depress the defensive mechanisms in the gastric mucosa, an effect which can be modified by changes in the hormonal balance of the body.

2197 EFFECT OF DIFFERENT FOODS ON THE ACIDITY OF THE GASTRIC CONTENTS IN PATIENTS WITH DUODENAL ULCER. PART III: EFFECT OF ALTERING THE PROPORTIONS OF PROTEIN AND CARBOHYDRATE.

(E.) Lennard-Jones, J. E. (Cent. Middlesex Hosp., London, England), J. Fletcher and D. G. Shaw. *Gut* 9(2):177-182, 1968.

Fourteen patients with duodenal ulcers were given isocaloric physiological diets (1800 or 2300 calories/day) containing a constant amount of fat but varying amounts of protein and carbohydrate, and samples of gastric juice were taken every 30 min from 8:00 A.M. until 10:00 P.M. on two consecutive days. After each meal, the acidity tended to drop to a lower level and to rise more slowly with the high-protein diet (150 g protein, 205 g carbohydrate, 102 g fat) than with the low-protein diet (27 g protein, 323 g carbohydrate, 102 g fat). On the diets providing 2300 calories/day, the acidity tended to remain less with the high-protein diet for 1 hr after breakfast, 1.5 hr after lunch, 1 hr after tea, and 2.5 hr after supper (the meal providing the most protein). In a similar study, 6 patients with duodenal ulcers were given test lunches of equal consistency (400 ml liquid plus 310-315 g solids) and equal fat content (25-26 g) but varying proportions of protein (53.5 or 7.5 g) and carbohydrate (71 or 118 g). Results were essentially the same, in that the acidity fell to lower levels and remained low longer after the high-protein lunch. In another 6 patients, test meals containing 50 g of either unrefined corn-meal (10 g% protein) or refined corn-flour (0.5 g% protein) were compared and unrefined corn-meal was found to produce a more significant drop in gastric acidity. Finally, 8 patients were given a test breakfast containing 120 g of either white bread (8 g% protein) or brown bread plus wheat germ (9 g% protein); again, the breakfast containing slightly more protein produced a slightly more marked drop in gastric acidity. It is concluded that protein may indeed stimulate gastric acid secretion but that it also buffers the acid produced, the net result being that gastric acidity is reduced to lower levels for longer periods after high-protein than after low-protein meals. This is of direct relevance to the question of a suitable diet for patients with gastroduodenal ulcers.

2198 BLOOD SEROTONIN LEVELS IN PATIENTS WITH GASTRIC AND DUODENAL ULCERS.

(Rus.) Podil'chak, M. D. (Lvov Med. Inst., USSR), R. V. Rudyi and E. S. Abragamovich. *Klin. Khir. (Kiev)* (3):35-40, 1968.

Blood serotonin levels were determined by the method of Dalgliesh et al. (*J. Physiol.* 120:282, 1955), based on its contractile effect on segments of rat colon, in 46 patients (26-62 yr old) with gastric (14), pyloric (12), or duodenal ulcers (20); all of the pyloric ulcers were complicated by stenosis, while 5 of 14 gastric ulcers and 7 of 20 duodenal ulcers were complicated by bleeding. The blood serotonin was found to be significantly decreased in all cases, but especially in cases of ulcer complicated by bleeding (1.96-2.12 μg% compared to 23 μg% in controls); patients with uncomplicated duodenal and gastric ulcers showed values averaging 9.86-10.16 μg%, while the average value in pyloric ulcer was 12.36 μg%. At the time of discharge following partial gastrectomy (Reichel-Polya-Finsterer), the serotonin level had increased in all cases, to average values of from 10.93-11.91 μg% (in patients with ulcers which had been complicated by bleeding) to 16.31-18.62 μg%. The serotonin content in the area of gastric mucosa affected by the ulcer was also found to be decreased in cases complicated by bleeding (to 5-6 μg% compared to 11 μg% in controls) but not in chronic uncomplicated ulcers; in pyloric ulcers with pyloric stenosis, in fact, the serotonin content averaged 14 μg%. It is concluded that serotonin plays a role in both hemostasis and gastric motility, and that a deficiency of serotonin may contribute to the pathogenesis of bleeding ulcers.

2199 EXPERIENCE WITH PYLOROPLASTY AND VAGOTOMY: A REVIEW OF 184 CASES.

(E.) Mead, P. H. (Hartford Hosp., Conn.). *Amer. J. Surg.* 114(6):910-912, 1967.

Among 184 patients (134 men and 50 women, 15-89 yr old) treated by truncal vagotomy plus pyloroplasty (Heineke-Mikulicz type) for pain, bleeding or intestinal obstruction during the period 1961-65, the overall operative mortality was 3.3% (6 cases); the mortality ranged from 1.3% among patients treated by elective surgery to 2% among all duodenal ulcer patients and 12% among 34 patients requiring emergency surgery for massive bleeding (due to duodenal ulcer in 24 cases and gastric ulcer in 4). The underlying diagnoses included duodenal ulcer (148 cases), gastric ulcer (14 cases, including 2 who also had duodenal ulcers and 2 who also had hiatal hernias), hiatal hernia (13 cases), gastritis, telangiectasis, duodenal lipoma and other conditions. Simultaneous additional surgery was required in 49 patients. In the overall group, 53% had tube gastrostomies and 22% had suture of an ulcer. There were no complications in 149 patients (81%), whose duration of postoperative hospitalization was 8-16 days (mean 11-12 days). The 41 complications encountered in 35 patients included delayed emptying (8 cases), recurrent bleeding (6 cases), pneumonia (5 cases), wound infection (4 cases), and cystitis (3 cases). The 6 deaths (all in patients over 69 yr old) were due to bleeding, pneumonia, pulmonary hemorrhage, leukemia, abdominal abscess with pancreatitis and duodenal obstruction, and myocardial infarction. A 1-6 yr follow-up revealed 5 cases of recurrent duodenal ulcer after intervals of 3-29 months. It is concluded that vagotomy plus pyloroplasty is the procedure of choice in duodenal ulcer, and experience in the treatment of gastric ulcer, peptic esophagitis and gastrointestinal bleeding is described as encouraging.

2200 STUDIES OF THE EPIDEMIOLOGY OF PEPTIC ULCER IN A RURAL COMMUNITY: PREVALENCE AND NATURAL HISTORY OF DYSPEPSIA AND PEPTIC ULCER.

(E.) Weir, R. D. (Dept. Publ. Health Soc. Med., U. Aberdeen, Scotland) and E. M. Backett. *Gut* 9(1): 75-83, 1968.

A postal-questionnaire and interview study, supplemented by a review of the related medical records, was carried out in 1960-63 on all the males aged 15 or over in a semi-rural practice comprising approximately 1500 male patients in northeastern Scotland. Replies to mailed questionnaires were received from 1487 patients in 1960 and from 1392 patients in 1963. Relatively high prevalence rates of 154 and 102 per thousand, resp., were found for severe dyspepsia and demonstrable peptic ulcer. Dyspepsia was most common in the age group from 25 to 44 yr, while peptic ulcer was more common after the age of 45. Various possible explanations are offered for the high peptic ulcer rate (existing or past) of 117 per thousand, and it is felt that at least some of the excess is due to a true geographical difference between Scotland and England. Of the 143 ulcers reported, 136 were duodenal and only 7 gastric. Comparison of data obtained at the beginning and end of the 3-yr period revealed an apparent recovery rate from dyspepsia of 17/1000/yr (65% of 295 males with dyspepsia in 1960 still reported dyspepsia in 1963) and a case inception rate of 16/1000/yr (among 1053 males who were free of symptoms in 1960, 69 had developed dyspepsia by 1963). The importance of dyspepsia rather than diagnosed peptic ulcer as a measure of morbidity in this general condition is emphasized, and it is suggested that the rate of peptic ulcer per 1000 dyspeptics (305 in this survey) may be of value from a public health point of view.

2201 PARTIAL GASTRECTOMY AND CHOLELITHIASIS. *(E.)* Schreiber, H. W. (Marien Hosp., Hamburg, Germany), A. Luchmann and W. Koch. *German Med. Monthly* 13(3):116-120, 1968.

Among 2088 men (30-60 yr old) with gastric or duodenal ulcers observed for periods up to 19 yr (average 11 yr), 793 developed symptoms necessitating diagnostic radiology of the biliary tract and 239 of these were found actually to have gallstones. These 239 patients included 61 (9.1%) of 673 ulcer patients treated conservatively and 178 (12.5%) of 1415 patients subjected to a Billroth II gastrectomy, compared to a normal incidence of cholelithiasis of about 5.5% in men of the same age group. The incidence of gallstones, furthermore, increased in proportion to the duration and severity of the peptic ulcer disease. Among the 178 gastrectomy patients who developed cholelithiasis, gallstones were diagnosed before gastrectomy in 103 cases, during gastrectomy in 9 and after gastrectomy in 66. These patients also showed a high incidence (103 cases) of other complications, however, including: acute cholecystitis (51 cases), bleeding and perforation of the ulcer (31 cases), acute hepatitis (17 cases), and acute pancreatitis (4 cases). It is concluded that there is a definite positive association between peptic ulcer disease and cholelithiasis; patients with one should be examined for the other, and if there are indications for the operative treatment of one of these disorders, surgery is recommended for both. On the other hand, the incidence of cholelithiasis in patients with partial gastrectomy is no higher than the general incidence and the concept of postgastrectomy cholelithiasis has not been confirmed. If a patient with a partial gastrectomy does develop cholelithiasis, early surgery is recommended to prevent the otherwise high incidence of complications.

2202 SOME PROBLEMS IN THE TREATMENT OF GASTRODUODENAL ULCERS: RESULTS OBTAINED WITH ANTILONE (UROGASTRONE). *(Fr.)* Boncour, R. (Bichat Hosp., Paris, France) and A. Monges. *Clinique* 63(640):165-167, 1968.

Urogastrone (usually at a dose of 4 tablets/day, each tablet containing 6 rat U) was used in the ambulatory treatment of 37 patients (33 men and 4 women) with gastric (8 cases) or duodenal (30 cases) ulcers, 4 of which had perforated. Excellent results were obtained with urogastrone alone in 15 cases, improvement usually appearing 3-6 days after initiation of treatment. Another 17 patients (5 of whom received urogastrone in combination with other therapy) showed varying degrees of improvement, while 5 patients showed no effect. Signs of intolerance were reported by only one patient, and were relieved by belladonna. Since prescriptions of rest and strict diets were impossible in these ambulatory patients, it is concluded that urogastrone has a definite therapeutic effect, although the role of psychic factors in peptic ulcer disease is admitted. In 13 cases, furthermore, discontinuous maintenance treatment with urogastrone (10 days every month) seemed to help in preventing recurrences.

2203 CARBOHYDRATE METABOLISM IN ULCER PATIENTS BEFORE AND AFTER GASTRIC RESECTION. *(Rus.)* Zinevich, V. P. (Leningrad Pediat. Med. Inst., USSR). *Vestn. Khir. Grekov* 100(4):29-33, 1968.

Pre- and postoperative determinations of the fasting blood sugar in patients operated on for peptic ulcer demonstrated that gastrectomy has no significant effect on blood sugar levels. Thus, preoperative hypoglycemia (blood sugar of 60-80 mg%) was found in 22 of 53 patients with peptic ulcer (including 5 with duodenal ulcers following previous gastroenterostomy and 3 with jejunal ulcers following gastrectomy); there was no relation between blood sugar and ulcer site, but 4 of the 5 with a previous gastroenterostomy were hypoglycemic. Blood sugar determinations 7-60 days postoperatively revealed hypoglycemia in 16 of 39 peptic ulcer patients. Only 14 patients, however, had been tested both before and after the operation, and among these 14, the blood sugar fell in 5, rose in 7 and was unchanged in 2. Blood sugar determinations 1-8 yr after surgery for peptic ulcer revealed normal values in 17 of 20 patients. Glucose tolerance tests in peptic ulcer patients (19 tested preoperatively, 18 tested 7-60 days after surgery, and 6 tested 2.5-7 yr after surgery) revealed 4 types of curves. While 7 of 19 and 5 of 18 blood sugar curves were normal, 5 of 19, 10 of 18 and 6 of 6 had a curve with a high rise and a rapid drop; 4 of 19 and 1 of 18 curves showed a slow rise and gradual decline, and in 3 of 19 and 2 of 18 cases the blood sugar curve was flattened. Again, there was no relation between glucose tolerance and ulcer site, and the blood sugar curves remained the same in most cases after surgery. Possible mechanisms for the development of hyperglycemia after gastric resection are discussed.

2204 ANTISECRETORY EFFECTS OF LIBRAX IN PATIENTS WITH DUODENAL ULCER. *(E.)* Head, H. B. (Northwest. U. Med. Sch., Chicago, Ill.) and J. B. Hammond. *Amer. J. Dig. Dis.* 13(6):540-550, 1968.

The antisecretory effectiveness of a standard dose of Librax (5 mg clidinium bromide + 10 mg chlordiazepoxide) was determined in 20 patients with radiologically confirmed duodenal ulcer and a pH of basal gastric secretion consistently below 4.0 by means of a paired, 6-hr, placebo-controlled test. The drug was found to produce significant reductions in mean hourly acidity (increases in pH), mean hourly secretory volume, hourly total acid output, hourly volume as a percentage of control, and hourly acid output as a percentage of control, in decreasing order of magnitude. Maximal decreases to 59.21% of the premedication gastric secretory volume and 57.63% of the premedication total acid output were observed 3 hr after ingestion of Librax. There was only an insignificant decrease in titratable acidity, but the antisecretory effects of Librax were of the same magnitude in the 10 highest secretors as in the 10 subjects with the lowest basal secretion. These antisecretory effects are ascribed solely to the anticholinergic effects of clidinium bromide. Since a pH of greater than 4.5 was achieved in only 5 of the 20 subjects, the clinical effectiveness remains in doubt. However, there were no side effects, so that an increase in dosage would be possible. Administration of placebo (240 mg lactose) was followed by a surprisingly significant increase in acid output (from 3.12 to 4.666 mEq/hr) and acid concentration (from 35.725 to 42.450 mEq/liter) and a decrease in gastric pH (from 2.35 to 1.96). No explanation is offered for this effect.

2205 **THE TREATMENT OF BLEEDING GASTRIC ULCERS.** *(Ger.)* Maruyama, I. (Munic. Hosp., Osaka-Juso, Japan). *Med. Welt* (19):1222-1227, 1968.

On the basis of favorable experience with 6 personal cases (males, 23-60 yr old), conservative treatment with diet and medications is recommended in all cases of bleeding gastric ulcers in which emergency surgery is not imperative, followed by gastrectomy only if the dietary and supportive measures do not produce a cure in 3 months. In some cases, bleeding can be stopped surgically by ligation of the appropriate vessels prior to conservative treatment of the ulcer itself. Among these 6 cases, 5 had gastric pain (3 of 5 with bloody stools and 3 of 5 with bloody vomitus) while one merely had an "unpleasant feeling" in the abdomen. Conservative treatment (8-41 weekly injections of Primobolan-Depot plus diet, antacids, rest and agents designed to promote healing), either while in the hospital or on an ambulatory basis (2 cases), led to the disappearance of occult bleeding and the radiologically demonstrable ulcer niche in all cases; disappearance of the ulcer was confirmed by gastrocamera in all 4 cases examined. The time required for disappearance of the ulcer was 2-3.7 months in 4 of 6 and 9.5-22 months in 2 of 6, the latter 2 being treated partly on an ambulatory basis. In addition to the anabolic agent (doses of 25-100 mg), the patients received vitamin U, lactobacilli, propantheline bromide, copper chlorophyllin, diastase, sodium bicarbonate, aluminum hydroxide and/or aluminum and magnesium silicates. The importance of evaluating the severity of the bleeding in order to make a rational choice of treatment in these cases is emphasized. Emergency surgery is recommended only in cases of shock and anemia in which the blood pressure cannot be raised above 100 mm Hg by transfusion of 400-1000 ml blood.

2206 **HYPERCALCEMIA IN PATIENTS WITH PEPTIC ULCERATION RECEIVING LARGE DOSES OF CALCIUM CARBONATE.** *(E.)* Stiel, J. N. (Royal North Shore Hosp., Sydney, Australia), C. A. Mitchell, F. J. Radcliff and D. W. Piper. *Gastroenterology* 53(6):900-904, 1967.

Hypercalcemia developed in 6 of 28 patients (14 men and 14 women; 30-87 years old; average age, 51) with gastric (15 of 28) or duodenal (13 of 28) ulcer treated with 30-40 g (500 mg/kg) of calcium carbonate daily for 3 weeks; in 5 of 6, hypercalcemia appeared within 48 hours following the onset of treatment. No hypercalcemia predisposition was evident in the patients studied. The onset of hypercalcemia was manifested through such symptoms as clinical features of hypercalcemia or alkalosis (nausea, vomiting, anorexia, weakness or lethargy, headache, and dizziness; mental changes were noted in one patient. The symptoms disappeared upon cessation of therapy.

2207 **ULCEROGENIC EFFECT OF 5-HYDROXYTRYPTAMINE (SEROTONIN) IN THE STOMACH: HISTOCHEMICAL STUDY BY FLUORESCENT METHOD.** *(E.)* Tobe, T. (Fac. Med. Kyoto U., Japan), M. Fujiwara and T. Muryobayashi. *Ann. Surg.* 166(1):1002-1007, 1967.

Intraperitoneal administration of 5-hydroxytryptamine (5-HT–50 mg/kg) produced large ulcers on the greater curvature of the glandular stomach in all rats (Wistar) and mice (dd strain) 8 hours after treatment, although a few ulcerations appeared within 6 hours. Administration of 5-hydroxytryptophan (5-HTP–300 mg/kg) induced smaller gastric ulcers in all animals at 12 hours after treatment. Macroscopic and histologic appearance of lesions induced by both agents resembled acute human stomach ulcer. Fluorescent microscopy demonstrated the presence of 5-HT or 5-HTP in cells surrounding the tunica muscularis mucosa, as well as in the smooth muscle and in the cytoplasm of mast cells, 2 hours following treatment. The results suggest that the ulcerogenic effect of both compounds studied is due not only to angiospasm, but also to strong contractions of the smooth muscle.

2208 **THE ANTRUM IN PATIENTS WITH DUODENAL AND GASTRIC ULCERS.** *(E.)* Schrager, J. (Royal Albert Edward Infirm., Wigan, England), R. Spink and S. Mitra. *Gut* 8(5):497-508, 1967.

Seventy-five surgical specimens of duodenal ulcer (71 men and 4 women; 25-76 years old; average age, 40) and 40 of stomach ulcer (23 men and 17 women; 46-72 years old; average age, 55) were sectioned and classified according to the severity of the inflammatory changes. The main changes–those showing inflammatory reaction and no destruction of pyloric glands and those resulting in damage and destruction of the pyloric glands with increasing intestinalization–were found only in the antrum and were primary and independent of the ulcer. Mild inflammation was associated with duodenal ulcer, while stomach ulcer was associated with marked changes and degeneration with metaplasia and decreased gastric secretion. The size of the antrum in ulcer patients was larger than in 16 subjects with normal stomachs. The findings suggest that increased antrum may be connected with severe degeneration of antral mucosa and hyposecretion.

2209 **VAGOTOMY AND PYLOROPLASTY FOR PERFORATED DUODENAL ULCER. OBSERVATIONS ON 180 CASES.** *(E.)* Hinshaw, D. B. (Loma Linda U. Sch. Med., Calif.), R. J. Thompson Jr. and R. Carter. *Amer. J. Surg.* 115(2):173-176, 1968.

Vagotomy with pyloroplasty used as the primary treatment in 180 patients (163 men and 17 women; mean age, 43) with perforated duodenal ulcer resulted in 1.1% mortality and minimal morbidity. The complication rate was 6.1% and included subcutaneous wound infections, pneumonia, and thrombophlebitis. There was 1 pelvic abscess requiring surgical drainage and 1 instance of delayed gastric emptying, which required gastrojejunostomy. The postoperative course was smooth, and there was no evidence of leakage when pyloroplasty was performed or of mediastinitis following vagotomy.

2210 COMPARATIVE STUDIES OF THE CLINICAL EFFECTS OF TRUNCAL AND SELECTIVE GASTRIC VAGOTOMY. *(E.)* Sawyers, J. L. (Vanderbilt U. Med. Ctr., Nashville, Tenn.), H. W. Scott Jr., W. H. Edwards, H. J. Shull and D. H. Law. *Amer. J. Surg.* 115(2):165-172, 1968.

A prospective randomized clinical study of 145 patients with various diseases of the alimentary tract (98 duodenal ulcers, 22 stomach ulcers, 18 hiatal hernias, 6 marginal ulcers, and 1 leiomyoma of the stomach) revealed that selective gastric vagotomy is significantly superior to truncal vagotomy in achieving complete vagal denervation of the stomach. Seventy-five percent of the patients with selective vagotomy and 64% of those with truncal vagotomy had excellent response, while 21% and 29%, resp., had good response. There were no differences between the 2 procedures with regard to nutrition, weight gain or loss, anemia, dumping symptoms, bowel function, gastric stasis, or in the length of time necessary for the return of intestinal peristalsis. The only disadvantage of selective gastric vagotomy was the increased technical difficulty of the procedure.

2211 CLINICAL MANIFESTATIONS IN PATIENTS WITH CHRONIC ATROPHIC GASTRITIS, GASTRIC ULCER, AND DUODENAL ULCER. *(E.)* Edwards, F. C. (West Middlesex Hosp., Isleworth, England) and N. G. Coghill. *Quart. J. Med.* 37(146):337-360, 1968.

A comparative study of 84 chronic gastric ulcer patients, 119 duodenal ulcer patients, and 221 nonulcer dyspepsia patients was made using the types, severity, time of onset, duration, location, and effects of pain as criteria for diagnosing the various conditions; the nonulcer dyspepsia patients were separated into those with chronic gastritis and those with miscellaneous minor changes in gastric mucosa determined by gastric biopsy. Differential diagnosis between gastric and duodenal ulcers could not be made with the use of X-rays. Clinical differences were sharper between peptic ulcer and nonulcer dyspepsia patients, and between nonulcer dyspepsia patients with and without gastritis. There was insufficient evidence to suggest that chronic gastritis caused a specific dyspepsia; nonetheless, it appears that it may produce dyspeptic symptoms in some patients.

2212 GASTRIC SECRETION IN ULCER PATIENTS BY DYE-DILUTION TECHNIQUE. PART IV. ACID RESPONSE TO AUGMENTED HISTAMINE TEST AFTER MEDICAL VAGOTOMY, SURGICAL VAGOTOMY AND PARTIAL GASTRECTOMY. *(E.)* Sen, S. B. (Jawaharlal Inst. Postgrad. Med. Educ. Res., Pondicherry, India). *Indian J. Med. Res.* 56(3):349-354, 1968.

The contribution of vagal and antral mechanisms toward "tonal influences" on the secretory capacity of the parietal cell mass in response to augmented histamine stimulation and the rational criteria for selection of duodenal ulcer patients with regard to the choice of surgical treatment were investigated in 71 male duodenal ulcer patients, ages 14-65 years. Phenol red-dilution technique was used for determining gastric emptying, secretion rates, and acid output after histamine stimulation. Chemical vagal block was produced by a s.c. injection of hexamethonium bromide (50 mg) and atropine sulfate (0.6 mg); this procedure is referred to as "medical vagotomy." Twenty-two patients were surgically vagotomized and 22 received limited partial gastrectomy. The correlation between maximum histamine response and the reduction in acid response after medical vagotomy was highly significant. Despite the significance, the medical vagotomy acid response cannot be predicted nor can the postoperative reduction be predicted from the medical vagotomy reduction in individual cases. Therefore, medical vagotomy cannot be used for selection of cases for the choice of surgical treatment. The reduction in acid response after partial gastrectomy was statistically greater and significantly different from that observed after surgical vagotomy. The dominance of the antral mechanism tonic influence over the vagal mechanism influence is implied by linear regression equations.

2213 CONSIDERATIONS OF STATISTICS ON POST-AGGRESSIVE PERFORATION OF GASTRODUODENAL ULCER. *(Fr.)* Tica, A. (Craiova Hosp., Rumania), G. Cornea, I. Farcas and F. Purcaru. *Lyon Chir.* 64(2):193-197, 1968.

Acute gastroduodenal ulcer, contrasted with the classical Cruveilhier ulcer, is described and 7 cases are reported which were confirmed at surgery or at autopsy. The cases included 2 histories of multiple head trauma, an attempted suicide, acute intraperitoneal bleeding after perforation, circulatory embarrassment with severe cerebral involvement, and perforation after a wrestling match. The difficulties in diagnosis and the necessity of differentiating these ulcers from the simple gastric ulcer are stressed.

2214 ON 58 CASES OF STRESS ULCER. *(Ger.)* Spirgi, E. (Surg. Clinic, U. Basel, Switzerland) and M. Rossetti. *Helv. Chir. Acta* 35(1/2):44-51, 1968.

A study was made of 58 cases in order to investigate the pathogenesis, course, therapy, and prophylaxis of the life-threatening stress-ulcer complications. The patients were predominantly male and over 60 yr. The ulcers were often multiple and predominantly in the duodenum. The course was usually acute with bleeding as the most serious and frequent complication. The stress ulcer patient is almost always a seriously ill or seriously disturbed patient with multiple disorders or complaints. The most frequent basic illness involved is developing or metastasized carcinoma, and the second most frequent is a septic condition. Only in the worst cases can surgical therapy be risked. Of the 58 cases, only 3 survived. Prophylaxis should consist of adjusted doses of antacid and anticholinergics, and stomach secretion aspiration in order to prevent stasis and to lessen the danger of gastric ulcer.

2215 MISTAKES IN PEPTIC ULCER SURGERY IN THE EARLY YEARS: A PHYSIOLOGIC

ANALYSIS. *(E.)* Dragstedt, L. R. (Dept. Surg., U. Gainesville, Florida) and E. R. Woodward. *Ann. Surg.* 167(6):886-900, 1968.

Hypersecretion of stomach acid and the stasis of food in the stomach, which stimulates gastrin-induced stomach secretion, have been shown to cause gastric ulcers. The entrance of acid chyme into the duodenum exerts an inhibitory effect on gastric secretion. Gastrojejunostomy for duodenum ulcers proved a beneficial treatment because it diverted corrosive acid chyme away from the duodenum; however, it failed to reduce hypersecretion and exposed the less resistant jejunum to the ulcerogenic effect of gastric content. Duodenal ulcers were healed but stoma ulcer developed. The procedure also removed the inhibitory action and alkaline neutralization of the duodenum. The Roux-en-Y and entero-entero anastomoses for duodenal ulcers removed the duodenal neutralization effect; the proposed Schmilinsky operation would have brought both ulcerogenic factors into play. Gastric ulcers induced by hypersecretion due to stasis are healed by gastrojejunostomy; in this instance, the procedure corrects the stasis and abolishes the hypersecretion. Gastroenterostomy for gastric ulcers was abandoned prematurely because of its failure in duodenal ulcer treatment. Vagotomy is now the accepted surgical treatment for gastric ulcers; it eliminates the vagal release of gastrin and renders the gastric glands less responsive to secretory stimulation. The low mortality associated with this procedure and the preservation of storage function in the stomach justify the use of vagotomy over partial gastrectomy in surgical treatment of gastric ulcers.

2216 ROLE OF GASTRIC ACID IN ASPIRIN-INDUCED GASTRIC IRRITATION IN THE RAT. *(E.)*

Brodie, D. A. (Merck Inst. Therap. Res., West Point, Pa.) and B. J. Chase. *Gastroenterology* 53(4):604-610, 1967.

The mechanism of aspirin-induced gastric irritation was investigated in fasted male Holtzman rats (125-175 g). The animals were sacrificed 4 hr after aspirin administration; the stomachs were removed and examined for the presence of 2 mm hemorrhagic areas which indicated positive gastric damage. A dose-dependent incidence of gastric irritation was observed after both oral and i.p. aspirin administration. The lowest dose producing a significant level of hemorrhage was 64 mg/kg of body weight. A low incidence of hemorrhagic lesions was seen after s.c. aspirin administration; aspirin was poorly absorbed by this route, with the precipitated drug, inflammation, and edema observed at the injection site. The incidence of aspirin-induced irritation was reduced by anticholinergics, antacids, and a ganglionic blocking agent; central nervous system depressants, ether, and meprobamate did not significantly reduce the incidence of irritation. Vagotomy significantly reduced gastric secretion and the incidence of irritation following oral and parenteral administration. The drugs that reduced lesion incidence also reduced gastric secretion at the same doses that antagonized aspirin-induced irritation. The dose of antagonist producing a 50% inhibition of titratable acid output at pH 3.5 caused a 50% inhibition of gastric hemorrhage. Increasing the dose of aspirin reduced the volume and titratable acidity of gastric juice. This study demonstrated that gastric irritation did not require the direct contact of aspirin with gastric mucosa and that HCl was required for aspirin-induced gastric lesions. The data support the theory of back-diffusion as the mechanism of aspirin-induced gastric hemorrhage.

2217 APPRAISAL OF THE LONG-TERM RESULTS OF VAGOTOMY AND PYLOROPLASTY IN 100 PATIENTS WITH BLEEDING DUODENAL ULCER. *(E.)*

Farris, J. M. (Good Samaritan Hosp. Med. Ctr., Los Angeles, Calif.) and G. K. Smith. *Ann. Surg.* 166(1):630-639, 1967.

Vagotomy and pyloroplasty with ligation of the bleeding vessel were shown to give results as good as, if not superior to any other operative procedure in a long-term study of 100 male and female bleeding duodenal ulcer patients, ages 32-89 years. The reduction in initial mortality was the outstanding advantage of the technique, even though a significant number of patients required second operations. The effectiveness of the operation should be noted by surgeons, when confronted with an ulcer in the pancreas or in proximity to the common duct.

2218 HEMORRHAGIC ULCERS. A STUDY OF 100 OBSERVATIONS IN A NAVAL HOSPITAL.

(Fr.) Roux, M. (Sainte-Anne Hosp., Toulon, France), M. Sardet, N. Herne, A. Tafani and F. Le Gall. *Bordeaux Med.* 1(1):17-24, 1968.

Of the 100 cases, 47 patients presented with hematemesis and 53 with melena. The distribution was 29 with gastric ulcers (19 with hematemesis, 11 with melena), 69 with duodenal ulcers (28 hematemesis, 41 melena), and 2 with combined involvement (1 hematemesis, 1 melena). The age distribution was 44 patients less than 30 yr (54% with hematemesis, 23% with gastric ulcers), 25 between 30 and 50 yr (56% with hematemesis and 24% with gastric ulcers), 58 less than 40 yr, and 31 over 50 yr (29% with hematemesis and 42% with gastric ulcers). Twenty patients underwent surgery, 7 of which were gastrectomies. No deaths occurred in those less than 50 yr, and 3 occurred in those over 50 yr. Severity of bleeding, response to drug and surgical therapy, and the function of age in the incidence and distribution of ulcer hemorrhage are compared.

2219 ULCER DISEASE IN CHILDREN. *(It.)*

Leonardi, L. (Inst. Pediat., U. Parma, Italy) and G. Piatoni. *Lattante* 38(11):601-636, 1967.

A review of literature and observations of 14 cases are presented, with a discussion of incidence, classification, etiopathology of the disease, the psychological factors of the patient, symptomatology, gastric chemistry, radiology, differential diagnosis, prognosis, and therapy. The symptoms of abdominal pain and vomiting are characteristic. Radiological considerations should include not only evidence of niches but of inflammation particularly at the duodenal bulb.

2220 SALIVARY SODIUM/POTASSIUM RATIO IN PEPTIC ULCER. *(Rus.)*

Sprintson, R. G. and N. P. Kislyi. *Klin. Med.* 66(2):44-48, 1968.

2221 SYMPTOM PICTURE OF PEPTIC ULCERS IN THE OPERATED STOMACH AS RELATED TO ULCER SITE. *(Rus.)* Smekhova, M. D. *Klin. Med.* 66(2): 48-53, 1968.

2222 ULCEROGENIC FACTORS IN MEN AND WOMEN. *(Rus.)* Sarvanov, A. M. *Klin. Med.* 66(2):57-62, 1968.

2223 PROBLEMS IN THE USE OF GANGLIONIC BLOCKING AGENTS IN THE TREATMENT OF PEPTIC ULCER. *(Rus.)* Burchinsky, G. I. and V. G. Troianskaia. *Klin. Med.* 66(2):79-85, 1968.

2224 REMOTE RESULTS OF SUTURE TREATMENT OF PERFORATING GASTRODUODENAL ULCERS. *(Rus.)* Petrov, A. F. (Belgorodskaia Oblast Hosp., USSR). *Khirurgiia* 44(2):57-60, 1968.

2225 CLINICAL PICTURE AND TREATMENT OF PEDIATRIC GASTRODUODENAL ULCERS. *(Rus.)* Myshkin, K. I. (S. M. Kirov Mil. Med. Acad., Leningrad, USSR). *Khirurgiia* 44(2):37-42, 1968.

2226 IMMEDIATE AND REMOTE RESULTS OF SUPRADIAPHRAGMATIC VAGOTOMY FOR PEPTIC ULCERS FOLLOWING GASTRIC RESECTION. *(Rus.)* Uteshev, N. S. (5th Municipal Clin. Hosp., Kazan', USSR) and G. V. Pakhomova. *Khirurgiia* 44(2):29-33, 1968.

2227 THE TREATMENT OF PERFORATING GASTRIC ULCER FROM THE ONCOLOGICAL VIEWPOINT. *(Rus.)* Epifanov, N. S. (Kirovskaia Oblast Cancer Clinic, USSR) and E. P. Svedentsov. *Khirurgiia* 44(2):26-29, 1968.

2228 IMMEDIATE AND REMOTE RESULTS OF VARIOUS METHODS OF SURGICAL TREATMENT OF GASTRIC AND DUODENAL ULCERS. *(Rus.)* Mazurik, M. F. (Poltava Regional Hosp., USSR) and V. D. Karnaukh. *Klin. Khirurgiia* (1):15-18, 1968.

2229 MECHANISM OF ACTION OF TRANSFUSED DONOR BLOOD AND BLOOD COMPONENTS ON THE BLOOD COAGULATION AND ANTICOAGULATION SYSTEMS IN ULCER PATIENTS. *(Rus.)* Chistiakov, V. A. (Kiev Clin. Hosp., Health Ministry USSR), and G. A. Belitskaia. *Klin. Khirurgiia* (1):10-15, 1968.

2230 PERFORATED PEPTIC ULCER IN SOUTH WEST SCOTLAND. *(E.)* Nielson, J. (Royal Infirmary, Dumfries, Scotland). *J. Roy. Coll. Surg. Edinb.* 13(1):40-45, 1968.

2231 PERFORATED PEPTIC ULCER TREATED BY SIMPLE CLOSURE: HOSPITAL EXPERIENCE. *(E.)* Tobias, S. (Hahnemann Med. Coll. & Hosp., Philadelphia) and F. E. Rosato. *Amer. Surg.* 34(5):378-381, 1968.

2232 PEPTIC ULCER: A REVIEW OF THE RECENT LITERATURE ON VARIOUS CLINICAL ASPECTS. PART II. *(E.)* Kirsner, J. B. (Dept. Med., U. Chicago, Ill.). *Gastroenterology* 54(5):945-975, 1968.

2233 PRIMITIVE ULCEROID STATES IN THE FAMILIES OF ULCER PATIENTS. *(Fr.)* Dubarry, J. J. (St. Andre Hosp., Bordeaux, France), A. Quinton and A. Cler. *Gaz. Med.* 74(28):5207-5209, 1967.

2234 CANCER IN STOMACHS OPERATED ON FOR BENIGN LESIONS, ESPECIALLY DUODENAL ULCER. *(Fr.)* Dupuy, R. (Beaujon Hosp., Paris, France) and D. Sicard. *Gaz. Med.* 74(28):5223-5229, 1967.

2235 PEPTIC ULCER: A REVIEW OF THE RECENT LITERATURE ON VARIOUS CLINICAL ASPECTS. PART I. *(E.)* Kirsner, J. B. (Dept. Med., U. Chicago, Ill.). *Gastroenterology* 54(4):611-641, 1968.

2236 THE EVALUATION OF RECURRENT SYMPTOMS AFTER VAGOTOMY AND PYLOROPLASTY. *(E.)* Williams, J. A. (Gen. Hosp., Birmingham, England). *Proc. Roy. Soc. Med.* 61(3):211-212, 1968.

2237 MANAGEMENT OF PEPTIC ULCER. *(Rev.)(E.)* Kay, A. W. (West. Infirm., Glasgow, Scotland) and I. E. Gillespie. *Scot. Med. J.* 13(4):110-115, 1968.

2238 STUDY OF THE USE OF KAY'S TEST IN PATIENTS WITH GASTRODUODENAL ULCER. *(Rum.)* Createanu, G. (Inst. Med. Pharm., Iasi, Rumania) and R. Stanciu. *Rev. Med. Chir.* 71(4):859-864, 1967.

2239 MASSIVE HEMORRHAGE IN PEPTIC ULCER. *(E.)* Jedd, F. L. (Rochester, New York). *J. Abdom. Surg.* 10(5):128-131, 1968.

2240 GASTRIC ULCERS IN PATIENTS SUBJECTED TO ORCHIECTOMY AND TELECOBALT THERAPY TO THE LUMBOAORTIC LYMPHATIC CHAIN FOR SEMINOMA. [THREE CASES] *(It.)* Taddei, L. (Inst. Radiol., U. Florence, Italy) and A. Aulisi. *Nunt. Radiol.* 33(5):517-531, 1967.

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2242 DIFFERENTIATION OF BENIGN ULCER FROM ULCERATING CARCINOMA. *(Rus.)* McDowell, W. (Tulane U. Sch. Med., New Orleans, La.), C. M. Nice and J. Soileau. *Bull. Tulane U. Med. Fac.* 27(2):155-158, 1968.

2243 VAGOTOMY IN THE TREATMENT OF GASTRODUODENAL ULCER. *(It.)* Pietri, P. (Gen. Surg. Clinic, U. Modena, Italy) and P. A. Fantoni. *Rass. Clinicosci.* 44(3):79-82, 1968.

2244 **OBSERVATIONS ON CERTAIN CHARACTERISTICS OF GASTRODUODENAL ULCERS IN A FACTORY ENVIRONMENT. CLINICAL AND STATISTICAL STUDY.** *(It.)* Lamarca, S. (Inst. Gen. Surg. & Surg. Ther., U. Turin, Italy) and E. Vercellotti. *Minerva Gastroent.* 13(4):113-116, 1967.

2245 **BIOLOGICAL AND ENVIRONMENTAL CHARACTERISTICS OF ULCER DISEASE IN MAN: CLINICAL AND STATISTICAL INVESTIGATION.** *(It.)* Lamarca, S. (Inst. Gen. Surg. & Surg. Ther., U. Turin, Italy), G. Giribone, L. Roccia and S. Abeatici. *Minerva Gastroent.* 13(4):108-112, 1967.

2246 **LUMINAL pH IN NORMAL SUBJECTS AND IN PATIENTS AFFECTED BY DUODENAL ULCER.** *(It.)* Lanfranchi, G. A. (Inst. Special Med. Path., U. Bologna, Italy), L. Barbara, P. Azzaroli, M. G. Marlettini and B. Mantovani. *Minerva Gastroent.* 13(4):117-122, 1967.

2247 **INTESTINAL ABSORPTION OF AMINO ACIDS FOLLOWING GASTRIC RESECTION FOR ULCERS.** *(It.)* Barbara, L. (Inst. Gen. Med. & Med. Ther., U. Bologna, Italy), P. Azzaroli, S. Ferri, G. A. Lanfranchi and N. Calamelli. *Minerva Gastroent.* 13(4):123-129, 1967.

2248 **BIOPSY OF SMALL INTESTINE IN CHRONIC DUODENAL ULCER.** *(Pol.)* Grala, R. (1st Intern. Med. Clin., Poznan Acad. Med., Poland) and E. Simon. *Pol. Tyg. Lek.* 23(22):816-818, 1968.

2249 **PSEUDOTUMORAL FORMS OF GASTRIC ULCER.** *(Por.)* Bettarello, A. (Fac. Med., U. Sao Paulo, Brazil), M. Tacla, S. Zaterka and H. W. Pinotti. *Rev. Paul. Med.* 71(1):1-10, 1967.

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2252 **CHANGES IN THE DRUG THERAPY OF ULCERS.** *(Ger.)* Henning, N. (Fichtestrasse 7, Erlangen 852). *Munch. Med. Wschr.* 110(17):1049-1053, 1968.

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2255 **SURGICAL TREATMENT OF JUXTAESOPHAGEAL GASTRIC ULCER FOLLOWING GOITER RESECTION.** *(Por.)* Paulino, F., M. Cury, A. Vieira, U. Martins and A. Roselli. *Hospital (Rio)* 73(4):37-53, 1968.

2256 **TECHNIQUE FOR SELECTIVE BILATERAL GASTRAL VAGOTOMY IN GASTRIC AND DUODENAL ULCER.** *(Ger.)* von Ackeren, H. *Actuelle Chir.* 3(3):161-168, 1968.

2257 **PEPTIC ULCER TREATMENT IN PERFORATION.** *(Sp.)* Vidal, A. M., C. F. Cabal, A. Monroy, A. Olivares and C. Lavalle. *Cir. Cir.* 35(1):79-89, 1968.

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2259 **SOME CURRENT PROBLEMS OF THE SURGICAL TREATMENT OF ULCER DISEASE.** *(Rus.)* Maiat, V. S. (2d N. I. Pirogov Moscow Med. Inst.), Iu. M. Pantsirev and A. A. Grinberg. *Klin. Med.* 46(4):8-12, 1968.

2260 **CALCIUM AND MAGNESIUM BLOOD LEVELS IN ULCER PATIENTS.** *(Rus.)* Makhmudova, D. Kh. (Tashkent Inst. Postgrad. Med. Studies, USSR). *Med. Zh. Uzbek.* (1):49-51, 1967.

2261 **CONSIDERATIONS ON THE POST-RESECTION PEPTIC ULCER.** *(Sp.)* Sitges Creus, A. *An. Med.* 53(3):281-288, 1967.

2262 **ANTIPERISTALTIC GASTRIC OUTLET AFTER GASTRECTOMY: EFFECTS ON NUTRITION—AN EXPERIMENTAL STUDY.** *(E.)* Little, J. M. (Dept. Surg., West. Infirm., Glasgow, Scotland). *Brit. J. Surg.* 54(11):958-961, 1967.

2263 **AN ASSESSMENT OF VASCULAR LIGATION PROCEDURES IN THE STOMACH IN THE TREATMENT OF GASTRIC BLEEDING OR PEPTIC ULCER.** *(E.)* Roberts, G. R. (Connaught Hosp., London, England). *Brit. J. Surg.* 54(11):940-943, 1967.

2264 **SURGICAL TREATMENT OF PEPTIC ULCER.** *(E.)* Silberman, V. A. (Kaiser Found. Hosp., Los Angeles, Calif.) and J. H. Winkley. *Arch. Surg.* 97(1): 84-95, 1968.

2265 **CIRCULATING GASTRIN IN PEPTIC ULCER DISEASE.** *(E.)* Giles, G. R. (U. Dept. Surg., Gen. Infirm., Leeds, England) and C. G. Clark. *Brit. J. Surg.* 54(10):834-838, 1967.

2266 **THE RESULTS OF A POLICY OF SELECTIVE SURGICAL TREATMENT OF DUODENAL ULCER.** *(E.)* Small, W. P. (West. Gen. Hosp., Edinburgh, Scotland), J. Bruce, C. W. A. Falconer, W. Sircus and A. N. Smith. *Brit. J. Surg.* 54(10):838-841, 1967.

2267 **SOME ASPECTS OF ACETYLCHOLINE METABOLISM IN GASTRIC AND DUODENAL ULCER DISEASE.** *(Rus.)* Zhavoronkova, L. Iu. (I. M. Sechenov 1st Moscow Med. Inst., USSR) and D. I. Shagal. *Ter. Arkh.* (5):58-64, 1968.

2268 **PARASYMPATHOLYTIC AGENTS IN DUODENAL ULCER. DOUBLE-BLIND CONTROLLED TRIAL WITH OXYPHENCYCLIMINE HYDROCHLORIDE.** *(E.)* Goyal, R. K. (Maulana Azad. Med. Coll. & Irwin Hosp., New Delhi, India), O. P. Bhardwaj and H. K. Chuttani. *J. Indian Med. Ass.* 50(8):365-367, 1968.

2269 **THE TREATMENT OF ULCERS OF THE STOMACH AND DUODENUM IN THE OFFICE.** *(Ger.)* Heupke, W. (Schwedenpfad 24, Bad Homburg v.d. H. 638, Germany). *Materia Med. Nordmark* 20(5):233-244, 1968.

2270 **EXPERIENCE WITH PROXIMAL PARTIAL GASTRECTOMY FOR PEPTIC ULCER OF THE GASTRIC FUNDUS.** *(Jap.)* Aizawa, N. (Nagoya Natl. Hosp. Aichi, Japan), A. Koide and H. Miyakawa. *Iryo* 21(10): 1218-1221, 1967.

2271 **TUBERCULOUS PEPTIC ULCER.** *(E.)* Gupta, O. P. and K. Gangwal. *J. Indian Med. Ass.* 50(2):75, 1968.

2272 **THE PREVENTION OF ACUTE GASTRIC ULCER IN THE RAT BY ALPHA-METHYLDOPA.** *(E.)* Djahanguiri, B., S. Hemmati, D. Sadeghi and A. Firouzabadi. *Med. Pharmacol. Exp.* 17(5):427-433, 1967.

2273 **STUDIES ON THE EXPERIMENTAL GASTROINTESTINAL ULCERS PRODUCED BY RESERPINE AND STRESS. I. RELATIONSHIP BETWEEN PRODUCTION OF ULCERS AND CHANGES IN TISSUE MONOAMINES.** *(E.)* Doteuchi, M. *Jap. J. Pharmacol.* 17(4):638-647, 1967.

2274 **RECOVERY OF VILLOUS ARCHITECTURE IN GLUTEN ENTEROPATHY EXACERBATED BY GASTRO-JEJUNAL ANASTOMOSIS.** *(E.)* Weir, D. G. (Federated Dublin Voluntary Hosps., Ireland). *Postgrad. Med. J.* 44:234-237, 1968.

See also abstract nos.: 1711,1749,1751,1758,1760,1778,1855,1859,1925,2011,2016,2045,2663

Regional Enteritis

2275 **A REVISED CONCEPT OF ACUTE REGIONAL ENTERITIS.** *(E.)* Gump, F. E. (Coll. Phys. Surg., Columbia U., New York City), M. Lepore and H. G. Barker. *Ann. Surg.* 166(1):942-946, 1967.

Thirty-four patients (8-59 years old; average age, 29) with regional enteritis, 10 with the chronic form of the disease and 24 hospitalized with acute episodes, are reported. Twenty-three of the 24 acute cases remained free of any sign of progression to chronic regional enteritis for more than 2 years (average 9 years) following initial exploration for a clinical picture similar to acute appendicitis. The present findings are in agreement with 11 of 17 reported series, which may indicate that acute regional enteritis is unrelated to the chronic form of the disease.

2276 **DIVERTING ILEOSTOMY IN THE SURGICAL MANAGEMENT OF CROHN'S DISEASE OF THE COLON.** *(E.)* Oberhelman, H. A. (Stanford Sch. Med., Palo Alto, Calif.), S. Kohatsu, K. B. Taylor and R. M. Kivel. *Amer. J. Surg.* 115(2):231-240, 1968.

Thirteen patients (ages 13-58 yr) with Crohn's disease of the colon of 6 weeks to 10 years duration were subjected to diverting ileostomy after barium enema examination revealed the presence of the disease. Diarrhea, abdominal pain, and intermittent fever were common in all patients; 7 of the 13 patients had concomitant distal ileum involvement. The failure of salicylazosulfapyridine to cause remission, the complications related to colitis or to prolonged corticosteroid administration, and the growth and maturation retardation in adolescence due to the disease or therapy were the bases for patient selection. In all 13 patients, an excellent response to diverting ileostomy was obtained. Restoration of appetite; disappearance of fever, pain, diarrhea, and arthralgias; restoration of normal sedimentation rates; and resumption of normal growth and sexual maturation in the adolescent patients were observed after surgery. During the 3-24 month follow-up period, there has been no recurrence of symptoms or tendency to develop small bowel involvement in those patients with or without ileitis. Four episodes of ileostomy dysfunction occurred as a result of dietary indiscretion. Proctosigmoidoscopic and radiographic evidence of healing prompted the restoration of intestinal continuity in 3 patients. The ineffectiveness of diverting ileostomy in the treatment of ulcerative colitis illustrates the fundamental differences, clinical, histological and etiological, between it and Crohn's disease. The success of the procedure in treating Crohn's disease justifies its use in future cases.

2277 **EXPERIENCE IN SURGICAL TREATMENT OF REGIONAL ENTERITIS.** *(Fin.)* Elfving, G. (Surg. Clin., Hyvinkaa Hosp., Helsinki, Finland), J. Hästbacka, G. Fock and K. Saikku. *Duodecim.* 84(1):32-39, 1968.

2278 **ON THE PROBLEM OF REGIONAL ENTERITIS.** *(Bul.)* Altonkov, P. (Varna Med. Inst., Bulgaria), P. Chervenkov and L. Gospodinov. *Khirurgiia (Sofia)* 10(6): 544-547, 1968.

See also abstract nos.: 2385,2387

2279 SCLERODERMA (PROGRESSIVE SYSTEMIC SCLEROSIS) OF THE SMALL INTESTINE WITH MALABSORPTION: EVALUATION OF INTESTINAL ABSORPTION AND PANCREATIC FUNCTION. *(E.)* Scudamore, H. H. (Mayo Clin., Rochester, Minn.), P. A. Green, H. N. Hoffman II, J. W. Rosevear and W. N. Tauxe. *Amer. J. Gastroent.* 49(3):193-208, 1968.

In 8 patients (2 men and 6 women, 44-70 yr old, 7 Caucasian and 1 Negro) with scleroderma of the esophagus and small intestine, one of whom also had associated chronic liver disease, myxedema and mild diabetes, the only significant sign of malabsorption was mild-to-severe steatorrhea (fecal fat excretion of 8.7-42.4 g/day). Raynaud's phenomenon (duration of 1-25 yr) or skin manifestations (present in 5 of 8) had preceded the abdominal symptoms (duration of 3 months - 7 yr) in 7 of 8 cases, and appeared simultaneously in the other case. Constipation, alternating with diarrhea, and abdominal symptoms such as dyspepsia, heartburn, abdominal distension, cramps, nausea and vomiting (severe in 3 of 8), were more distressing than any symptoms which could be related to malabsorption. Weight loss amounted to 10-45 pounds in 3 months to 4 yr, and several of the patients were in serious condition (2 died). Radiological abnormalities in the colon were detected in 5 of 8 cases, while small intestinal biopsy revealed villous atrophy in 3 of 4 duodenal specimens and 4 of 8 jejunal specimens. Most laboratory tests of small intestinal absorption were normal, however, as were tests of liver function (normal in 7 of of 8) and vitamin A tolerance (normal in 6 of 7). Serum amylase and lipase were also normal in all 8 patients. Pancreatic response to secretin was abnormal in only 2 of 8 (volume of 0.8-1.65 ml/kg/hr and peak bicarbonate output of 9.8-25.4 mEq/kg/10 min). Absorption of radioiodinated oleic acid, although within normal limits, showed a pattern typical of lipase deficiency. This, and the favorable therapeutic response to pancreatic enzyme therapy (decreased fecal fat excretion and abdominal symptoms), suggests the possibility that a relative pancreatic insufficiency plays a role in the pathogenesis of steatorrhea associated with scleroderma.

2280 FAECAL FATS, APPETITE, AND WEIGHT-LOSS IN THE COELIAC SYNDROME. *(E.)* Gent, A. E. (St. Thomas's Hosp., London, England) and B. Creamer. *Lancet* 1(7751):1063-1064, 1968.

A retrospective study of 56 patients with an abnormal jejunal biopsy specimen typical of the celiac syndrome revealed steatorrhea (fecal fatty-acid excretion of 7.0-52.5 g/day) in only 42 cases, and no relation between steatorrhea and the severity of the illness. Among 28 patients with anorexia, 10 had normal fecal fat (compared to 4 of 28 with normal appetites), suggesting that anorexia may have prevented steatorrhea in some of the cases. However, weight loss was related more to appetite than to steatorrhea: of the 42 patients with steatorrhea, 5 showed weight losses of over 21 pounds and 13 showed no loss of weight, while among the 14 patients without steatorrhea, 2 showed weight losses of over 21 pounds and 2 showed none. All 7 of the weight-losing patients were anorexic; 14 of the 15 patients losing no weight had normal appetites (ascites in the 15th deprived weight of any significance).

2281 LACTASE AND OTHER DISACCHARIDASE DEFICIENCIES IN A HOSPITAL POPULATION. *(E.)* Littman, A. (VA Hosp., Hines, Ill.), A. B. Cady and J. Rhodes. *Israel J. Med. Sci.* 4(1):110-116, 1968.

Disaccharidase assays on biopsy specimens of small intestinal mucosa from the level of the ligament of Treitz in 138 male Caucasians revealed a lactase deficiency (< 1.0 IU/g wet weight) in all 5 cases of sprue, in 33-50% of patients with the postgastrectomy syndrome, regional enteritis, ulcerative colitis, diabetes, osteoporosis and severe obesity, and in 14-20% of patients with peptic ulcer, cirrhosis, pancreatic disease, psychiatric disorders and cancer; there was no lactase deficiency among patients with irritable colon, gout, pulmonary emphysema or cardiovascular disease as the primary diagnosis. When 45 patients with sprue, ulcerative colitis or regional enteritis were omitted, lactase deficiency was found in only 19.4% of the remaining 93 Caucasians, compared to 75% of 24 Negroes without the same diseases. The levels of invertase, maltase and isomaltase were not significantly lower in specimens from patients with lactase deficiency than in mucosa from normal subjects. The age distribution was also the same in the two groups, but patients with lactase deficiency drank less milk (average of 2.8 glasses/day compared to 3.5). A lactase activity of less than 1.0 IU/g was found to provide the best criterion for separating normal and deficient groups. However, assay of adjacent mucosa gave a value below 1.0 in 6.6% of cases classified as normal, and a value above 1.0 in 14% of cases classified as deficient. The maximal rise in blood sugar during the lactose tolerance test (100 g oral lactose) was 51.5 mg% in normal patients and 14.0 mg% in those with lactase deficiency. The test was accompanied by cramps, diarrhea or abdominal distension, alone or in combination, in 66.7% of patients with lactase deficiency and 15.5% of normal patients, the most common symptom being cramps. A combination of symptoms plus a flat blood-sugar curve was noted in 25 of 28 patients with lactase deficiency and only 3 of 67 normal subjects (4.5% false positives). Preliminary studies on the morphology of the small intestinal mucosa indicated that normal lactase levels were more often associated with the presence of cylindrical villi, while lactase deficiency was more often associated with leaf-shaped and convoluted villi, but these differences were not statistically significant.

2282 A STUDY OF THE ULTRASTRUCTURE OF THE HUMAN SMALL INTESTINAL MUCOSAL EPITHELIUM IN HEALTH AND IN IDIOPATHIC STEATORRHOEA. *(E.)* Shiner, M. (Cent. Middlesex Hosp., London, England). *Israel J. Med. Sci.* 4(1):76-99, 1968.

The ultrastructure of the villous and crypt epithelium of normal human jejunal mucosa was compared with that in specimens removed by peroral jejunal biopsy from patients with idiopathic steatorrhea. There were no apparent abnormalities in the immature or undifferentiated crypt cells in untreated idiopathic steatorrhea. The villous epithelium in these patients, however, showed shortening and irregularity of the microvilli, a marked increase in lysosome-like bodies in the supranuclear regions, more prominent Golgi complexes, endoplasmic reticulum and ribosomes, more indented rounder nuclei, and hyalinization or thickening of the basement membrane. In normal mucosal epithelium, there is a zone of differential proliferation, comparable to the neck cell region in the stomach, in which the absorbing type of cell grows upwards to form the villous epithelium and the secretory type of cell grows downwards to form the glands of Lieberkühn. This zone is probably located at the junction between the crypts and the villi, and is the area in which mitosis is seen. Any decrease in upwards cell growth seems to be accompanied by an increase in cell growth downwards. It is therefore postulated that in idiopathic steatorrhea, there is a developmental defect at the crypt level of the cells involved in differential specialization, more specifically involving the absorbing cells of the villi. Fewer and more abnormal villous cells are produced, and their viability may be decreased by their own lysosomal activity. The increase in crypt length seen in this disease is at the expense of the undifferentiated cell type.

2283 OCCURRENCE OF CEROID PIGMENT WITHOUT MALABSORPTION IN THAILAND. *(E.)*

Troncale, F. J. (Boston City Hosp., Mass.), L. H. Miller, G. T. Keusch, D. S. Comer, K. Chittayasothorn, W. Petchkit and S. W. Nye. *Gastroenterology* 54(6):1122-1128, 1968.

The results of upper gastrointestinal biopsies (Crosby-Kugler capsule) and absorption tests (xylose and vitamin A tolerance tests, fecal fat, and serum albumin, cholesterol and β-carotene) were compared in 63 patients (37 males and 26 females, 14-59 yr old) hospitalized for various reasons in the Udorn Provincial Hospital in northeast Thailand in order to assess the possible significance of the high prevalence of ceroid deposition revealed by autopsy studies of the Thai-Lao people in this region of Thailand. Ceroid pigment was found in the smooth muscle cells of the muscularis mucosae, in the sarcoplasm, and often at the nuclear poles in 19 of 35 antral biopsies and 4 of 4 esophageal biopsies, but in none of the 19 biopsies from the remainder of the stomach, duodenum or jejunum; 5 of the 63 biopsies could not be evaluated due to a lack of muscularis mucosae. The ceroid-positive group was composed of 14 males and 9 females, while the ceroid-negative group (defined as subjects in which biopsies from the gastric antrum contained no ceroid) was composed of 5 males and 11 females. The only significant difference between these two groups was a higher 2-hr serum xylose (P = 0.05) and a higher serum cholesterol (P <0.01) in the ceroid-negative group (which may well have contained patients with ceroid in other areas of the gastrointestinal tract). There was no difference in absorptive function between the study patients from Udorn and a normal population from Bangkok, where ceroid deposition is rarely seen. The serum β-carotene and albumin levels were lower in the Udorn group, but this is ascribed to dietary differences rather than to malabsorption. In addition to a markedly different diet (glutinous rice and raw or fermented fish) and a high prevalence of liver flukes, the Thai-Lao population of Udorn differs from the Bangkok population in the absence of a Chinese admixture. It is suggested, however, that ceroid deposition may be the result of vitamin E deficiency, alone or combined with a high intake of unsaturated fats.

2284 PHYSIOLOGIC ALTERATIONS IN SMALL BOWEL FUNCTION WITH AGE: THE ABSORPTION OF D-XYLOSE. *(E.)*

Guth, P. H. (Orange Co. Med. Ctr., Calif.). *Amer. J. Dig. Dis.* 13(6):565-571, 1968.

D-Xylose absorption as determined by either the 5-g or the 25-g xylose tolerance test in 127 subjects (10-96 yr old) who were free of gastrointestinal or genitourinary disease was found to be significantly decreased in persons over the age of 80. In the 5-g test, urinary xylose excretion was only 0.97 g/5 hr in the group over 80 compared to 1.29-1.56 g/5 hr in younger subjects. In the 25-g test, urinary xylose excretion was only 2.65 g/5 hr in those over 80 compared to 3.59 g/5 hr in the 70-79 yr age group (an insignificant decrease) and 4.72-4.92 g/5 hr in younger subjects. Maximal blood xylose was also lower in subjects over 80 (35.9 mg% compared to 45.7-50 mg%), and the peak was achieved more slowly. Analysis of these results suggested a decreased ability of the kidney to excrete xylose, as well as of the small intestine to absorb it, in subjects over the age of 80. There were no cases of xylose-induced diarrhea in the older subjects. Various possible mechanisms for the decrease in xylose absorption with age are suggested.

2285 CORRELATION BETWEEN THE INTESTINAL ABSORPTION OF TRITIATED VITAMIN D_3 AND DIGESTIVE FUNCTIONS IN TWELVE CASES OF OSTEOMALACIA. *(Fr.)*

Miravet, L. (Rheumatol. Clinic, Hosp. Lariboisière, Paris, France), A. Dryll, J.-C. Rambaud, J.-C. Bognei and D. Hioco. *Arch. Mal. Appar. Dig.* Suppl. 1, 89-90, 1968.

Intestinal absorption of vitamin D_3-^{3}H was measured in 9 normal subjects and 12 patients with osteomalacia subjected to complete digestive analysis. The absorption coefficient in normal subjects was 52-96% (average 68%). The 12 patients were of two types: 5 cases with normal absorption, and 7 cases with decreased absorption. Of the former group of patients, 1 patient had steatorrhea and 4 had normal digestive function. Of the latter group, 3 had sprue, 2 had undergone gastrectomy, 1 had exudative enteropathy, and 1 had biliary cirrhosis with stenosis of the biliary tract. Of these 7, all had significant digestive disturbance and steatorrhea. There was a significant negative correlation between the percent of intestinal absorption and the amount of fecal fat, although the daily lipid ratio was not rigorously controlled.

2286 MEDIUM CHAIN TRIGLYCERIDES, A USEFUL ADJUNCT IN NUTRITIONAL THERAPY. *(E.)*

Holt, P. R. (St. Luke's Hosp. Ctr., New York City). *Gastroenterology* 53(6):961-966, 1967.

Medium chain triglycerides have been used in place of long chain triglycerides in the diet of patients with malabsorption, and obstruction or abnormalities of the intestinal lymphatics; they have also been used in malabsorptive children with growth retardation, and in adults with severe steatorrhea due to small intestine resection and with exudative enteropathy with hypoproteinemia or chyluria due to lymphatic abnormalities. Medium chain triglycerides are more rapidly and completely hydrolyzed and absorbed than long chain triglycerides, and do not require bile or chylomicron formation for absorption; they may be absorbed intact and hydrolyzed in the intestinal mucosa cells. The fatty acids derived from medium chain triglycerides are principally transported by the portal vein. In malabsorptive patients, dietary medium chain triglycerides reduce fecal fat, water, mineral, and electrolyte loss. No major toxic reactions have been described, although minor side effects are common. Proper administration and dosage of medium chain triglycerides are important in overcoming the side effects.

2287 OBSERVATIONS ON ORAL BETAMETHASONE-17-VALERATE IN THE TREATMENT OF IDIOPATHIC STEATORRHOEA. [THREE CASES] *(E.)* Otaki, A. T. (West London Hosp., England), J. R. Daly and A. Morton-Gill. *Gut* 8(5):458-462, 1967.

2288 CHRONIC DIARRHEA AND FAILURE TO THRIVE SECONDARY TO GANGLIONEUROMA. *(E.)* Peterson, H. D. (Ft. Sam Houston, Texas) and O. Dale Collins. *Arch. Surg.* 95(6):934-936, 1967.

2289 MALABSORPTION AND JEJUNAL DIVERTICULOSIS. [TWO CASES] *(E.)* Knauer, C. M. (Santa Clara Valley Med. Ctr., San Jose, Calif.) and A. C. Svoboda. *Amer. J. Med.* 44(4):606-610, 1968.

2290 SYNDROMES OF WATER AND ELECTROLYTE DEPLETION OF INTESTINAL ORIGIN. *(Rev.)(E.)* Shields, R. (Roy. Infirm., Cardiff, Wales). *Scot. Med. J.* 13(4): 122-132, 1968.

2291 ASSESSMENT OF ABSORPTION FROM SMALL BOWEL. *(Rev.)(E.)* Watson, W. C. (Glasgow Roy. Infirm., Scotland). *Scot. Med. J.* 13(4):116-121, 1968.

2292 MULTIPLE PRIMARY CARCINOMATA IN IDIOPATHIC STEATORRHOEA. [CASE REPORT]. *(E.)* Fry, L. (London Hosp., England) and B. F. Russell. *Proc. Roy. Soc. Med.* 61(3):240-241, 1968.

2293 GLUCOSE ABSORPTION IN COELIAC DISEASE. *(E.)* Eggermont, E. (Lab. Physiol. Chem., Louvain U., Belgium), H. Loeb and P. Mainguet. *Lancet* 2(7529):1315, 1967.

2294 THE SYNDROME OF POST-GASTRECTOMY (EDEMATOUS) DEPIGMENTATION. *(Fr.)* Moretti, G. (Bordeaux), A. Broustet and J. Beylot. *Arch. Franc. Mal. Appar. Dig.* 57(2):197-207, 1968.

2295 ULTRASTRUCTURE OF INTESTINAL MUCOSA IN SOME CASES OF MALABSORPTION SYNDROME. *(Sp.)* Jimenez C., J. M. ("20 November" Hosp. Ctr., Mexico City, Mexico), K. Ambrosius D., R. Boom A., and Q. E. G. Leuze C. *Rev. Invest. Clin.* 19(4):343-349, 1967.

2296 MALABSORPTION IN CHILDHOOD. *(Ger.)* Shmerling, D. H. (Pediat. Clin., Zurich U., Switzerland). *Praxis* (11):359-364, 1968.

2297 INTESTINAL MALABSORPTION IN PATIENTS UNDERGOING ABDOMINAL RADIATION THERAPY. *(E.)* Dalla Palma, L. (Inst. Radiol., U. Florence, Italy). [Pp. 261-275 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

See also abstract nos.: 2391,2392,2393,2603

2298 MECHANISM OF PLASMA ALBUMIN LOSS IN CARCINOMA OF THE COLON. *(E.)*

Valberg, L. S. (Dept. Med., Queen's U., Kingston, Ontario, Canada), S. N. Huang and J. Ludwig. *Canad. Med. Ass. J.* 98(13):638-642, 1968.

The role of tumor size and location, the absence of normal epithelium, inflammation due to infection and tumor necrosis, increased permeability of blood vessels near the surface of the tumor, and bleeding from damaged vessels in the excessive loss of plasma albumin into the gastrointestinal tract was investigated in 7 patients (4 men and 3 women, 47-81 yr old) with carcinoma of the large intestine (3 cecum, 2 rectosigmoid, 1 transverse and 1 ascending colon). Three of these patients (2 with cecum cancer and 1 with a rectosigmoid tumor) showed excessive loss of radioiodinated human serum albumin (excretion of 1.3-3.5% of the administered dose) and all 3 also had diarrhea (as did one of the 4 other patients). Only 2 of the 3, however, had hypoalbuminemia, anemia and an elevated erythrocyte sedimentation rate (which were also associated in 2 of the 4 others), and only 2 of 3 had marked fecal blood loss. There was no relation between the loss of plasma albumin and the size or cellular characteristics of the tumor or the presence of mucus, fibrosis, ulceration, necrosis or inflammation in the outer portion of the neoplasm adjacent to the lumen. There appeared to be a correlation, however, between excessive protein loss and the surface vascularity of the tumor, small thin-walled vessels being more abundant near the surface of the tumor in the 3 patients with excessive protein loss. Since neither anemia nor blood loss was more common in these patients, it is suggested that albumin is lost by the oozing of plasma through the walls of intact blood vessels.

2299 CROHN'S DISEASE OF THE COLON AND ITS DISTINCTION FROM DIVERTICULITIS.

(E.) Schmidt, G. T. (St. Mark's Hosp., London, England), J. E. Lennard-Jones, B. C. Morson and A. C. Young. *Gut* 9(1):7-16, 1968.

A review of 137 cases of Crohn's disease of the colon revealed 26 in which Crohn's disease had developed in the region of colonic diverticula; in 14 of these the diagnosis was made on a resected specimen while in 12 the diagnosis of Crohn's disease was made by anal or rectal biopsy and the diagnosis of diverticulosis was made radiologically. Two patients were also discovered in whom the clinical diagnosis was diverticulosis but pathological examination showed Crohn's disease of the sigmoid colon without diverticula. Among the first group of 14, 9 had been diagnosed clinically as diverticulitis, 4 as Crohn's disease of the colon, and one as ulcerative colitis. In the other group of 12, the initial clinical diagnosis was Crohn's disease in 7, diverticulitis in 2, ulcerative colitis in 2, and tuberculous proctitis in 1. In view of the difficulty in differentiating between diverticulitis and Crohn's disease, the clinical, radiological and pathological characteristics of these 26 patients were compared with those in 50 patients operated on for diverticulosis without Crohn's disease. Although the age incidence was about the same in the two groups (39-86 yr with means of 62.0 and 57.6 yr, resp.), there were 11 men and 15 women in the first group and 33 men with 17 women in the second. Diarrhea and bleeding were more common in the first group (62-77% compared to 40-36%) while constipation, abdominal pain and weight loss were more common in the second group (32%, 82% and 32%, resp., compared to 8-19%). While 85% of the first group had anal lesions and another 12% had rectovaginal filtulae, no such lesions were found in the second group. Similarly, the results of sigmoidoscopy were abnormal in 88% of the 26 patients with combined disease, compared to 22% of the second group. In this second group, there was only one postoperative complication (anal fistula), while in the first group there was a total of 12 postoperative complications in 7 of the 14 patients who were resected; these 7 included 6 of the 9 operated on with a diagnosis of diverticulitis alone and only one of the 4 diagnosed correctly before surgery. The knowledge that Crohn's disease is present is therefore valuable and may affect the type of treatment given (e.g., treatment with sulfonamides or corticosteroids rather than sigmoid resection). Radiologically, Crohn's disease in the presence of diverticula was suggested by unusual fissuring, a mucosal lesion involving the rectum or colon away from the area of diverticular disease, or a fistula. Biopsy revealed noncaseating giant-cell granuloma in 10 of 11 anal lesions and 12 of 13 specimens of rectal mucosa from the first group. Pathological examination of resected specimens from these patients showed a diffuse mucosal lesion, transmural inflammation with the presence of fissures, and noncaseating giant-cell systems. It is concluded that the most reliable criteria for the diagnosis of Crohn's disease are the presence of a granulomatous or sarcoid type of tissue response with a transmural type of inflammation and fissuring of the bowel wall.

2300 VOLVULUS OF THE COLON. *(E.)*

Botsford, T. W. (Peter Bent Brigham Hosp., Boston, Mass.), S. J. Healey and F. Veith. *Amer. J. Surg.* 114(6):900-903, 1967.

The diagnosis and treatment of colonic volvulus are discussed on the basis of experience with 23 cases (18 of the sigmoid and 5 of the cecum) seen over a 30-yr period; these cases represented about 13% of all cases of large intestinal obstruction. There were 11 men and 12 women, and most were over 50, although two were 18 and 20 yr old, resp. The principal symptoms were a cramping pain in the lower abdomen, constipation, progressive abdominal distension, and vomiting; rectal bleeding was noted in 2 cases. The definitive diagnosis is by X-ray, and barium enema is recommended except in cases of suspected gangrene. Among the 18 patients with sigmoid volvulus (18-92 yr old), 12 were successfully treated by nonoperative detorsion; one of these was discharged, one died in 3 weeks of pneumonia, 4 had recurrences for which they were again treated, and 6 had elective resection 1-4 weeks after detorsion. Among the other 6 (including 2 in which nonoperative detorsion was unsuccessful), 3 had resection of the sigmoid (combined with transverse colostomy in 1 of 3) and 3 had surgical detorsion; one of the last 3 died and 2 had recurrences. Among the 4 women and 1 man with cecal volvulus, 2 were treated by decompression and detorsion, one had a primary right colectomy, and in 2 detorsion was accompanied by cecostomy or fixation of the cecum. Results were good in all

5 except that one of the 2 treated by decompression and detorsion experienced a recurrence in 5 months. Surgical detorsion plus cecostomy is recommended for cecal volvulus, while nonoperative detorsion followed by elective resection is recommended for sigmoid volvulus.

2301 CROHN'S DISEASE OF THE COLON. *(E.)* McGovern, V. J. (Roy. Prince Alfred Hosp., Sydney, Australia) and S. J. M. Goulston. *Gut* 9(2):164-176, 1968.

The clinical features, pathology and treatment of Crohn's disease of the colon are discussed on the basis of experience with 30 patients (11 males and 19 females, 6-69 yr old) seen during the past decade. The age of onset was below 40 in most of these patients, with equal incidence in the 2nd, 3rd and 4th decades. In 18 cases only the colon was affected (including the rectum in 5 of 18), while 12 patients had ileocolitis, although none of the latter showed signs of malabsorption and the jejunum was never involved. The course of the disease was quite variable, and the prognosis was generally better in those with ileocolitis than in those with involvement of the colon alone; 2 of the latter showed all of the clinical, biochemical and radiological features of fulminant ulcerative colitis. The principal symptoms were diarrhea (90%), weight loss (75%), pain (66%), abdominal tenderness (60%), fever (53%) and a palpable abdominal mass (only 6 cases). About half the patients had moderate anemia and leukocytosis, and the sedimentation rate was usually 30-50 mm/hr. Anal involvement was seen in 15 cases, fistulae in 9, but sigmoidoscopy and rectal biopsy were of no diagnostic value. Based on 27 resection specimens and one biopsy, the main pathological features of Crohn's disease of the colon were lymphocyte aggregates (particularly in the submucosa and subserosa), fibrosis (particularly in the submucosa and muscularis), tuberculoid granulomas (particularly in the submucosa), and fissures (seen in 17 of 28 cases). Ulceration followed a distinct pattern and was always preceded by an accumulation of lymphocytes without follicle formation beneath the mucosal tubules, in contrast to ulcerative colitis in which the initial changes are in the tubules. The first stage in ulceration appeared to be degeneration of the basal cells of the mucosal tubules immediately overlying a lymphocyte accumulation, followed by either failure of normal tubule regeneration (the least severe process), mucosal abscess formation with undermining of the mucosa, or fissure formation (the most severe process). Among the 12 patients with ileocolitis, 11 were subjected to surgery and 3 of 11 required further resections for recurrences at the site of anastomosis following right hemicolectomy. There were no deaths, and all the results were good with a follow-up of from 6 months to 6 yr. Among the 18 patients with colitis, 16 were subjected to surgery and 2 were treated medically; one of these 2, a man with acute disease involving the whole colon apart from the rectum, responded to 3 months of corticosteroid therapy and has remained well for 3 yr. Four others received corticosteroids and 2 of these had temporary improvement, but all required surgery. The 16 patients had a total of 30 operations and there were 2 postoperative deaths, one from intestinal obstruction and one from peritonitis. Ileorectal anastomosis was attempted 4 times in cases in which the rectum was spared, but was successful only in 2. Piecemeal resection always resulted in recurrence. It is concluded that the great majority of patients with Crohn's disease of the colon require surgery, and that resection of all the involved tissue should be the aim. Corticosteroid therapy is likely to be most helpful when the process is acute and as a prelude to surgery.

2302 EFFECT OF IRRITANT PURGATIVES ON THE MYENTERIC PLEXUS IN MAN AND THE MOUSE. *(E.)* Smith, B. (St. Bartholomew's Hosp., London, England). *Gut* 9(2):139-143, 1968.

Pathological examination of the myenteric plexus in a 57-yr-old woman with the cathartic syndrome who had been taking purgatives for over 40 yr showed a marked increase in the number of Schwann cells and a decrease in the number of neurons and axons. The remaining neurons were argentophilic with irregular and ill-defined margins and only one or two swollen processes. The axons ran singly rather than in bundles, and were irregular in caliber. There was also loss of interhaustral folds in the colon, reticulation of the colonic mucosa, stenosis and incompetence of the ileocecal valve, atrophy of the muscularis and fatty infiltration of the submucosa. In mice, intraperitoneal or oral administration of senna resulted in impairment of large intestinal peristalsis, water absorption and the usual contraction in response to trauma, while the plexi showed argentophilia, bending and fragmentation of the axons, retraction balls and swollen nerve endings. These changes appeared after 2 weeks of parenteral or 4 months of oral treatment, and were similar to the effects of mepacrine. It is concluded that the pharmacological effect of senna involves an action on the myenteric neurones, which may result in permanent damage after prolonged use.

2303 EXSTROPHY OF THE CLOACA. *(E.)* Graivier, L. (Children's Med. Ctr., Dallas, Tex.). *Amer. Surg.* 34(5):387-390, 1968.

The anatomic anomalies, embryology and treatment of cloacal exstrophy are reviewed and the surgical experience with 3 cases treated at the Children's Hospital of Pittsburgh is reported. This is a complex congenital anomaly involving the urogenital, gastrointestinal and nervous systems, and is sometimes dismissed as uncorrectable. The incidence is estimated at 1:200,000 births. Two of the 3 infants reported in detail (1 male and 2 females) were successfully operated by means of staged surgical procedures, but one of the girls died of sepsis and bronchopneumonia 52 hr after reduction of a volvulus and perineal pull-through. It is recommended that the first of the staged procedures be performed in the neonatal period, consisting of closure of the exstrophy, mobilization of the blind-ended colon, a perineal pull-through, and excision of the omphalocele. The medial edges of the bladder are united in the exstrophied state. Soon thereafter, repair of the myelocele and shunting for hydrocephalus are undertaken, if necessary. Between the ages of 1 and 2, the corrective surgery is completed by sacro-iliac osteotomy followed by inversion of the bladder exstrophy.

2304 SQUAMOUS-CELL CARCINOMA OF THE ANAL CANAL: REVIEW OF 21 CASES. *(E.)* Rosato, F. E. (Sch. Med., U. Pennsylvania, Philadelphia), W. Buck and E. F. Rosato. *Dis. Colon Rectum* 11(3):209-212, 1968.

Among 21 patients (5 men and 16 women, 45-82 yr old) admitted for anal carcinoma between 1943 and 1966, 9 also had hemorrhoids, 2 had a perineal fistula, 1 had lymphogranuloma venereum, and 1 had previously been treated for carcinoma of the ascending colon. The most common symptoms, present for an average of 7 months before diagnosis, were bleeding (13 cases), pain (9 cases) and weight loss (5 cases). One patient died before treatment could be begun, and 2 were treated by X-ray alone and then lost to follow-up. Two of the 3 patients treated by local excision died of recurrence (in 14-44 months), but one remains alive and free of disease after 12 yr. Among 15 patients treated by abdominoperineal resection (plus excision of the posterior vaginal wall in 5 cases and bilateral salpingo-oophorectomy in 3 cases), 4 died within 1 month, 4 more died in 4-31 months (3 of 4 with recurrence), 3 have survived for less than 5 yr (1 with a recurrence), and 4 have survived >5 yr (2 of 4 >10 yr). The survivors include 6 of 9 with negative nodes at the time of surgery and only 1 of 4 with positive mesenteric or inguinal nodes; 3 of the 6 patients with involvement of the rectovaginal septum have survived (3-16 yr to-date). The status of the mesenteric and inguinal lymph nodes is thus the best index of prognosis, and palpable nodes should be resected whenever possible. Abdominoperineal resection with wide perineal dissection, including the posterior vaginal wall, is the treatment of choice, although local excision may suffice in some high-risk patients with well-delimited tumors.

2305 POLYPOID LESIONS OF THE LARGE BOWEL IN CHILDREN WITH PARTICULAR REFERENCE TO BENIGN LYMPHOID POLYPOSIS.

(E.) Louw, J. H. (Div. Surg., U. Cape Town, S. Africa). *J. Pediat. Surg.* 3(2):195-209, 1968.

The 194 children (119 boys and 75 girls under the age of 13) with polypoid lesions of the large bowel seen at the Red Cross War Memorial Children's Hospital in Cape Town during the period 1957-66 included 155 with single polyps (144 juvenile and 11 others), 25 with scattered polyps (18 with juvenile polyps and 7 with other types, for a total of 85 polyps), and 14 with diffuse polyposis (2 juvenile and 12 others), and accounted for 0.08% of the 263,000 admissions to the hospital. Excluding the diffuse cases, 76.2% of the 240 polyps were rectal, 10% were in the sigmoid and 2.1-4.6% were in other segments of the colon. The size varied from 0.3 to 5.0 cm (mostly 0.5-1.5 cm) in diameter, and the peak age incidence was 3-6 yr of age. The "other" types included 2 carcinomas, 3 cases of adenoma, 2 of familial adenomatous polyposis coli, 2 of hemangioma, 1 of neurofibroma, 2 of the Peutz-Jeghers syndrome, 13 cases of inflammatory polyps, and 5 patients with benign lymphoid polyposis of the colon. Four of the latter (including 3 with diffuse polyposis of the colon and 1 with a single polyp) were siblings and consisted of a freckle-faced girl of 7 yr and 8 months with diffuse polyposis, a younger brother with a single polyp and freckles, a younger sister with diffuse polyposis but no symptoms, and a baby brother (3.5 yr) with diffuse polyposis and freckles. The mother had freckles and cafe au lait patches but no polyps, and neither the father nor the maternal siblings had any freckles. Histologically, there was hyperplasia of the submucosal lymphoid islands with the formation of large germinal follicles not unlike those of giant follicular lymphoma, but lacking its infiltrative and destructive qualities. The relationship of benign lymphoid polyposis to malignant lymphomas, hamartomas and juvenile polyposis is discussed, and the disease in these 4 siblings is distinguished from the Peutz-Jeghers syndrome and from neurofibromatosis. The possible genetic origin of these benign conditions (as distinguished from adenomatous polyposis) is analyzed in detail. Lymphoid polyposis is generally regarded as a reactive inflammatory lesion, the occasional familial occurrence of which is probably of genetic origin and related to the lymphoid reactivity of the organism. With regard to treatment, the first of the 4 patients was cured by prednisone (50 mg/day for 17 days, then gradually reduced to a maintenance dose of 10 mg/day which was continued for 6 weeks). Her sister, who also had intestinal worms, was cured by treatment with kanamycin followed by sulfaguanidine, while the other two cases were observed as controls because of the known incidence of spontaneous regression of benign lymphoid polyps. It is concluded that radical surgery, radiotherapy or cytotoxic drugs have no place in the treatment of this condition. Steroids and chemotherapy may be of value, but the need for any kind of treatment remains to be demonstrated.

2306 ADENOCARCINOMA OF THE COLON AND RECTUM: REVIEW OF 2,261 CASES OVER A 20-YEAR PERIOD.

(E.) Liechty, R. D. (Coll. Med., U. Hosp., Iowa City, Iowa), S. E. Ziffren, F. E. Miller, D. Coolidge and L. DenBesten. *Dis. Colon Rectum* 11(3):201-208, 1968.

Among 2261 patients (1241 males and 1020 females, 20-90 yr old but only 3.7% less than 40 and 31.7% 60-69 yr of age) with histologically proven adenocarcinoma of the colon and rectum who were treated during the period 1940-59, 90% already had symptoms at the time of first examination, while about 10% were detected by physicians during the course of other procedures. This was true despite the fact that 50% of the lesions were within reach of the sigmoidoscope and 70% were distal to the junction of the descending colon and sigmoid flexure. In the whole group, 12% had lesions of the ascending colon, 10% the transverse colon, and 3% the descending colon above the sigmoid; however, there was a significant increase in the proportion of colonic cancer and decrease in rectosigmoid cancer during the 20-yr period. Even though the delay between onset of symptoms and biopsy diagnosis decreased markedly during 20-yr period, there was no significant improvement in survival rates. The overall 5-yr survival rate was 31.5%, including 3% of the 470 patients with generalized disease at the time of diagnosis, 22% of the 628 with involvement of regional lymph nodes and/or neighboring organs, 49% of the 1050 with localized disease, and 58% of the patients considered by the surgeon to be potentially curable at the time of resection (47% of the group). Palliative surgery, carried out in 35%, had no effect on survival. Histologic grading was found to be of less prognostic significance than the extent of the lesion or the opinion of the operating surgeon. The prognosis was generally less favorable in the young and very old, in males compared to females, and in patients with cancer of the left colon. The 10-yr survival rate was 17.8-19.8% among private and clinic patients and 11.7% among indigent patients.

2307 THE SECOND LOOK OPERATION FOR CARCINOMA OF THE COLON AFTER ADMINISTRATION OF 5-FLUOROURACIL.

(E.) Mackman, S. (U.

Wisconsin Med. Sch., Madison) and A. R. Curreri. *Amer. J. Surg.* 115(2):227-230, 1968.

No signs of tumor recurrence were noted at second look operation in 14 of 19 patients with colon cancer the full thickness of the bowel wall or the regional lymph nodes and in 9 of 15 with involvement of adjacent organs, who received monthly courses of 5-fluorouracil for 4 months–more than 1 year following potentially curative resection. Similar results were seen in 1 of 5 patients who had residual neoplasm either in the mesenteric or perioartic nodes, liver, or other organs and who had a second look operation following palliative resection and chemotherapy with 5-fluorouracil for 1 or more years. No deaths occurred as a result of either surgery or chemotherapy. Although the number of cases studied was small and the duration of follow-up short, it appears that this program might prevent tumor recurrence.

2308 **NECROTIZING COLITIS.** *(E.)* Ghent, W. R. (Kingston Ontario, Canada) and R. Ceballos. *J. Abdominal Surg.* 10(6):157-159, 1968.

The case report of a 70-year-old man with "necrotizing colitis" secondary to an incarcerated inguinal hernia, who died 9 hours following colon resection, is presented. The etiology and pathology of the condition are believed to be similar to lamb dysentery and necrotizing jejunitis. Surgery, antigas gangrene serum, and antibiotics are recommended for therapy.

2309 **PREOPERATIVE RADIATION THERAPY AS AN ADJUVANT TO SURGERY FOR CARCINOMA OF THE COLON AND RECTUM.** *(E.)* Higgins, G. A. Jr. (Washington, D. C.), R. W. Dwight, W. S. Walsh and E. W. Humphrey. *Amer. J. Surg.* 115(2):241-246, 1968.

A preliminary report on 458 male patients with sigmoid and rectum adenocarcinoma followed for 24 months indicates that a slightly, but not significantly higher postoperative mortality occurs in subjects (212 of 458) who underwent preoperative reduction (32 of 212; 15.1%) than in the control group (25 of 231; 10.8%). In only 1 patient did it seem possible that X-ray therapy contributed to death, which was due to septicemia. Survival in the treated and control groups has remained the same (approximately 50%), although additional follow-up data are necessary for final evaluation.

2310 **A FIVE YEAR PROGRESS REPORT ON THE EFFECTIVENESS OF INTRALUMINAL CHEMOTHERAPY (5-FLUOROURACIL) ADJUVANT TO SURGERY FOR COLORECTAL CANCER.** *(E.)* Rousselot, L. M. (St. Vincent's Hosp., New York City), D. R. Cole, C. E. Grossi, A. J. Conte, E. M. Gonzales and B. Pasternack. *Amer. J. Surg.* 115(2):140-147, 1968.

The 5-year clinical study of 250 patients (134 men and 116 women) treated with 5-fluorouracil (5-FU), administered intraluminally and systemically following surgery for cancer of the colon or rectum revealed no significant improvement in survival rates (74%) in stage I and II cases (negative nodes; 154 of 250), as compared to the national averages (72.9%), and 74% in 60 controls. In the positive node group (stage III; 96 of 250) the 5-year survival rate was significantly improved and amounted to 65% for the 5-FU treated group, as compared to 32% in the nationwide series and 26% in 96 control patients. The cumulative survival rates for all stages was 72% for the 5-FU treated group and 54% and 40% for the nationwide and control series, resp.

2311 **PROGNOSIS IN DIVERTICULITIS.** *(E.)* Kyle, J. (Royal Infirm., Aberdeen, U. K.). *J. Roy. Coll. Surg. (Edinb.)* 13(3):136-141, 1968.

The 5-year follow-up study of 206 patients (74 men and 132 women; mean age, 68) with colonic diverticulitis, treated (surgery in 71, including 35 resections; nonoperative therapy in 135) between 1958 and 1961, revealed that 12% died from their disease and 34% died from unrelated diseases, mainly (cardiovascular); 80% of the survivors (44% of the total patients investigated) were free of symptoms for at least 5 years, and 21 (10%) had mild intermittent symptoms. In the present series, there were 18 free perforations into the peritoneal cavity and 5 proven colovesical fistulas. Four of the 35 patients who underwent resection died following surgery; of the 31 survivors, 7 died during the follow-up period, but in only 1 case was death attributable to diverticulitis; the remaining 24 patients were alive and free of symptoms.

2312 **HEREDITY AND ADENOCARCINOMA OF THE COLON.** *(E.)* Lynch, H. T. (M. D. Anderson Hosp. Tumor Inst., Texas Med. Ctr., Houston) and A. J. Krush. *Gastroenterology* 53(4):517-527, 1967.

A review of 725 members (564 actually examined) belonging to 4-5 generations of 6 "cancer families" revealed 173 individuals with cancer, including 81 with adenocarcinoma of the colon and 34 with multiple primary malignant neoplasms. In each family, at least 20% of the individuals at risk have developed cancer, and many are still below the age at which cancer is likely to occur. No significant difference was found between the number of males and females with carcinoma in these 6 families, but the average age at onset for each family (35-54 yr for cancer and 37-51 yr for adenocarcinoma of the colon) was lower than that expected in the general population. None of these patients showed familial polyposis coli. Several sibships in these 6 families showed a particularly high incidence of carcinoma. For example, of 13 siblings in the first family, 7 showed carcinoma and 4 of these had multiple primary malignant neoplasms, each time involving the colon; 4 out of 5 generations in this family had been affected by cancer. In the 2nd family, carcinoma of the colon appeared in 3 consecutive generations. One sibship was comprised of 11 individuals, 8 of whom had histologically confirmed carcinoma, including 4 with multiple primary malignant neoplasms (3 of 4 involving the colon). In one sibship of family number 3, in which adenocarcinoma of the colon occurred in 4 generations, 3 of the 5 individuals with carcinoma had multiple primary malignant neoplasms, all 3 involving the colon. Of 8 members of the 4th family with a diagnosis of carcinoma, 4 had adenocarcinoma of the colon in 2 consecutive generations. Two of the 8 had multiple primary malignancies, one with involvement of the colon. Carcinoma of the colon occurred in 5 generations in family number 5, and among 10 individuals with multiple primaries, 8 had malignancies of the colon. Eleven members in 3 generations of the 6th family had malignant neoplasms, and all of these involved the colon; also, 6 of the 9 individuals in the 3rd generation had multiple primary malignancies. Analysis of the pedigrees of these families shows that carcinoma of the colon is transmitted in a pattern consistent with an autosomal dominant factor. It is pointed out, however, that the overwhelming majority of cases of adenocarcinoma of the colon, which is the most frequently occurring internal malignancy in the USA, seem to be caused by nongenetic factors. A review is also presented of other hereditary disorders (familial polyposis coli, Gardner's syndrome, Peutz-Jeghers syndrome, solitary polyps, ulcerative colitis, juvenile polyposis coli, and Turcot's syndrome) in which adenocarcinoma of the colon is an integral part.

2313 INTRAMURAL COLO-ANOSTOMY FOR THE SURGICAL TREATMENT OF HIRSCHSPRUNG'S DISEASE. *(E.)* Lilly, J. R. (Children's Hosp., Washington, D. C.), C. W. Wesselhoeft and J. G. Randolph. *Ann. Surg.* 166(1):955-963, 1967.

An evaluation is given of a new surgical operation for Hirschsprung's disease, performed over an 18-month period on 10 children with aganglionic megacolon, and the postoperative management problems encountered are discussed. The technique, which consists of rectal mucosal resection with intramural colo-anostomy, is felt to be safe and effective. Dissection within the rectal wall minimizes pelvic sepsis, protects against pelvic nerve injury and leaves fecal continence mechanisms undisturbed. The overlapping autoanastomosis eliminates the complications of anastomotic leak, fistulas, or strictures. The new procedure is useful in reoperation following unsuccessful alternative procedures for Hirschsprung's disease, particularly in the presence of pelvic infection.

2314 SURGICAL TREATMENT OF DIVERTICULAR DISEASE OF THE COLON: EVALUATION OF AN ELEVEN-YEAR PERIOD. *(E.)* Levy, S. B. (Dept. Surg., U. Pennsylvania Sch. Med., Philadelphia), W. T. Fitts Jr. and J. B. Lench. *Ann. Surg.* 166(1):947-954, 1967.

An 11-year retrospective evaluation of 104 patients treated surgically is presented, these patients representing 21% of patients known to have diverticular disease during this period and 41% of all with diverticulitis. No trends were seen in use of 1-, 2-, or 3-stage procedures, but morbidity was 10 times greater in 3-stage than in 1-stage procedures. Of 6 hospital deaths, only 1 was related to the type of procedure selected. Complications developed in 25% of 1-stage procedures, 57% of 2-stage, and 66% of 3-stage. Rehospitalizations (5%) and recurrences (10-15%) followed all stage procedures in equal numbers. More than 70% of patients were operated on during the year of diagnosis and over 90% within 4 years of diagnosis. Incidence was significantly lower in the nonwhite population.

2315 COLONIC INJURY RESULTING FROM ANGIOGRAPHIC CONTRAST MEDIA. *(E.)* Killen, D. A. (Surg. Res. Lab., VA Hosp., Nashville, Tenn.), R. Sewell and J. H. Foster. *Amer. J. Surg.* 114:904-909, 1967.

Since aortography and selective inferior mesenteric arteriography are becoming more frequently applied techniques, a study was made of the effects of sodium iothalamate (Angio-CONRAY®) as contrast medium on mongrel dog colon. Inferior mesenteric arteriography was performed on 2 groups of dogs (7.4-15.2 kg), grouped by dose of medium (1 ml/kg and 2 ml/kg of 80% solution of sodium iothalamate). The aorta was occluded above and below the origin of the artery by vascular clamp and the medium injected. It appears that the arteriography using this medium can be performed with relative safety although a toxic effect was demonstrated in the present study. However, the mechanical trauma associated with the technique is the major determinant of the risk factor.

2316 A PRELIMINARY EVALUATION OF THE RESULTS OF TREATMENT OF HIRSCHSPRUNG'S DISEASE BY THE DUHAMEL-GROB MODIFICATION OF THE SWENSON PULL-THROUGH OPERATION. *(E.)* Dorman, G. W. (Children's Med. Ctr., Dallas, Texas), T. P. Votteler and L. Graivier. *Ann. Surg.* 166(1):783-791, 1967.

An evaluation is presented of treatment of 61 children with Hirschsprung's disease during the period 1951-1966. The Swenson operation was performed in 31 children (6 months to 11 years of age) and the Duhamel-Grob modification in 30 children (age 11 weeks to 15 years), and a follow-up study included 22 and 23 patients of each group, resp. Minor complications occurred in each group, but mortality and incidence of major complications was higher in the Swenson group. Normal bowel function was preserved more frequently in the Duhamel-Grob series. A description of the surgical technique is given.

2317 ELIMINATION OF THE LETHAL PROPERTIES OF GANGRENOUS BOWEL SEGMENTS. *(E.)* Barnett, W. O. (U. Mississippi Med. Ctr., Jackson), R. I. Oliver and R. L. Elliott. *Ann. Surg.* 167(6):912-919, 1968.

After simple intestinal obstruction, gram-negative bacterial endotoxins are produced. In order to prevent general body tissue exposure to the toxins, a study was carried out to determine the efficacy of antibiotics administered by routes other than by intraluminal injection, a method which is unfeasible in a segment of strangulated bowel. Adult mongrel dogs were grouped as donor and recipient dogs: 1) the donors (244 dogs) underwent a surgical procedure which produced an isolated segment of ileum with blood vessels ligated, while intestinal continuity was established by an end-to-end anastomosis of the cut ends of ileum by-passing the gangrenous segment; 2) the recipients (248 dogs) underwent laparotomy for peritoneal inclusion of the donor gangrenous segment (28 hr after strangulation). The donor and recipient dogs were divided into 4 series testing: 1) the comparative efficacy of Kantrex, Chloromycetin and Keflin in eliminating the lethal properties of a 10 cm bowel segment after venous strangulation; 2) the influence of Keflin on the lethal characteristics of a gangrenous bowel segment after arterial strangulation; 3) effects of Keflin on the lethal potential of 20 cm segments of strangulated ileum; and 4) the efficacy of Keflin in neutralizing the lethal properties of 30 cm segments of gangrenous ileum. In the first series, each donor received 1 of the 3 antibiotics tested, and the recipient dogs received no antibiotic.

Of the dogs receiving bowel segments from Keflin-treated donors, 16 survived 48 hr or longer, compared to only 3 and 7 surviving recipients of segments from Kantrex- and Chloromycetin-treated donors. Further grouping and experimental variations are described in detail. Keflin given i.p. appeared more effective than Kantrex or Chloromycetin in neutralizing the lethal potential of gangrenous segments up to 30 cm in length for periods up to 28 hr. The effectiveness varied with the concentration achieved within the peritoneal cavity. Where other factors were constant, the intraperitoneal route of antibiotic administration gave best results. Neither dilution of the antibiotic solution in 100 ml saline nor delay of injection up to 4 hours after onset of strangulation in the donor significantly affected results.

2318 HEMORRHAGE FROM DIVERTICULAR DISEASE OF THE COLON. THE ROLE OF EMERGENCY SUBTOTAL COLECTOMY. *(E.)* Olsen, W. R. (U. Michigan Med. Ctr., Ann Arbor). *Amer. J. Surg.* 115(2): 247-263, 1968.

Criteria for surgical management of large bowel hemorrhage are reviewed and evaluated. From 1955 through 1966, 13 patients have required 14 emergency operations for 16 episodes of hemorrhage. Emergency colectomy was performed on 13 occasions, and emergency subtotal colectomy 7 times. Several features are emphasized: 1) clinical diverticulosis is infrequent, 2) diverticulosis of the entire colon is common, 3) diverticula in the ascending colon are a frequent cause of hemorrhage, and 4) hemorrhage usually subsides spontaneously, but frequently recurs. Nonoperative management of acute hemorrhage is advised, but may not be successful. If surgery is necessary, removal of all colon containing diverticula is advised along with primary anastomosis, if feasible. Colostomy without colectomy is not advocated. Operative endoscopy and colotomies are usually ineffective and increase operative risk. It is felt that emergency subtotal colectomy is effective, relatively safe, and does not cause significant postoperative morbidity.

2319 REVERSIBLE VASCULAR OCCLUSION OF THE COLON: RECOGNITION AND MANAGEMENT. *(E.)* Byrd, B. F. Jr. (Vanderbilt U. Sch. Med., Nashville, Tenn.), J. L. Sawyers, R. L. Bomar and E. C. Klatte. *Ann. Surg.* 167(6):901-908, 1968.

A report is made of 8 patients (3 men, 5 women, age 49 through 82 yr, mean 65) with symptoms attributable to inferior mesenteric artery insufficiency (left-sided pain and bloody diarrhea). Techniques for detection include sigmoidoscopy and barium enema. Reversible vascular occlusive disease of the colon reflects a progression of changes: 1) initial edema of mucosa and submucosal hemorrhage; 2) inflammation of bowel wall and of peri-colic fat; 3) on the 5th day, sloughing of mucosa with development of shallow ulcers; 4) inflammation surrounding ulcerated area with development of associated rigidity; 5) the subsidence of the process with healing of ulcers and resolution of the inflammatory reaction and gradual resumption of motility. The lesion is felt to be reversible and self-limiting. Treatment consists of supportive therapy with close observation for evidence of necrosis and perforation.

2320 MECHANISM OF DIARRHEA OF VILLOUS ADENOMAS. *(E.)* DaCruz, G. M. G. (Sch. Med., U. Pennsylvania, Philadelphia), J. D. Gardner and G. W. Peskin. *Amer. J. Surg.* 115(2):203-208, 1968.

In order to determine the influence of villous adenoma extracts on *in vitro* colonic absorption of fluid and electrolytes, 164 adult male Sprague-Dawley rats (250-350 g) were sacrificed and the proximal and distal large intestines were everted to form 2 sacs. It was found that villous tumor (from the rectum and distal colon of humans) inhibited the net transfer of sodium, potassium, chloride, and fluid across the colon wall of the rat. By measuring the bidirectional flux of ^{22}Na across the colonic wall, it was demonstrated that the diminution of net transfer of this ion resulted from an increase in the serosal and mucosal component. These findings are discussed in relation to the hydroelectrolytic depletion syndrome associated with some villous adenomas in man.

2321 MODIFIED OPERATION FOR THE TREATMENT OF HIRSCHSPRUNG'S DISEASE. *(E.)* Pomerantz, M. (Duke U. Med. Ctr., Durham, N. C.) and D. C. Sabiston Jr. *Amer. J. Surg.* 115(2):198-202, 1968.

A modification of the Soave surgical technique was employed in 3 infants, one 27-year-old man, and in resection of the rectal segment of a patient who underwent total colectomy for ulcerative colitis with only mild involvement of the rectal segment. The procedure consists of resection of the aganglionic part of the colon with a perineal anastomosis of the proximal colon to the anus. The main advantage of the technique is the minimal dissection performed in the pelvis, with only the mucosa being dissected from the rectum. A tube of muscularis is left intact through which the colon is drawn for the perineal anastomosis. Improvements in defecation, rectal continence, and genito-urinary function are recorded, based on a 2-year follow-up of these patients.

2322 SURGICAL TREATMENT OF DIVERTICULITIS. TWENTY YEARS' EXPERIENCE. *(E.)* Colcock, B. P. (Lahey Clinic Found., Boston, Mass.). *Amer. J. Surg.* 115(2):264-270, 1968.

During the period from 1 Jan. 1947 to 1 Jan. 1967, 294 patients were operated on for diverticulitis (155 males, 139 females, age 30-81 yr, 21% less than 50 yr). Slightly more than half the patients had had symptoms for more than 1 year, 63 (21.4%) had had previous operations for diverticulitis, and patients are included who had procedures such as cecostomy for perforation of the sigmoid, colostomy followed by closure followed by second perforation for an enterovesical fistula, incision and drainage of an abscess without a colostomy resulting in a persistent fecal fistula, and patients with multiple abscesses and external and internal fistulas. The indications for surgery were perforation, obstruction, fistula, recurrent attacks of the disease, and occasionally failure to rule out carcinoma. One-stage resection was carried out in 61.2%. There were 7 deaths and an overall mortality of 2.38%. Mortality in primary 1-stage resection (180 patients) was 1.6%. There were no deaths in 3-stage resection patients (57). Much of the morbidity associated with the surgical treatment is due not to excessively frequent use of the 3-stage procedure, but to complications following 1-stage resection in patients with perforation or obstruction.

2323 **ELECTROMYOGRAPHY OF THE NORMAL HUMAN COLON.** *(Fr.)* Couturier, D. (Hosp. Bichat, Paris, France), C. Roze, M.-H. Couturier-Turpin and C. Debray. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):81-85, 1968.

Electromyographic recordings were carried out in 14 normal human subjects (no colonic disease detected by the usual diagnostic methods). Unipolar recording was accomplished using a positive silver electrode introduced into the sigmoid by sigmoidoscope and a neutral (ground) skin electrode. A basal electrical wave of slow regular voltage changes (frequency 10 cycles per minute, amplitude 0.2 to 0.4 mV) was recorded. The basal electrical level was not stable. The slow variation reflected progressive depolarization from pacemaker centers. Spikes occurred in bursts, representing action potentials from groups of muscle fibers.

2324 **THE EFFECT OF A GLUTEN-FREE DIET ON THE BONE LESIONS IN CELIAC DISEASE.** *(Fr.)* Bordier, P. (Hosp. Lariboisiere, Paris, France), A. Matrajt and D. Hioco, G. Hepner, K. Melvin and C. Booth. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):76-80, 1968.

Bone biopsies were taken from the iliac crest of 26 patients with celiac disease with and without suspected bone lesions. In an untreated group (16 patients), 7 had no lesions, 3 had early signs of osteomalacia and 6 had typical osteomalacia. In the patients treated with a gluten-free diet, 7 had no bone lesions and 3 had only early signs of osteomalacia. In these 10 patients, biopsies taken before and after 7 months on the gluten-free diet showed considerable reduction in the width of osteoid seams and reappearance of calcification. Results suggest that a gluten-free diet acts by restoring normal absorption of vitamin D.

2325 **THE ELECTROLYTE SECRETION OF VILLOUS TUMORS OF THE RECTUM.** *(Fr.)* Cremer, M. (Hosp. Bruggman, Brussels, Belgium), R. Kahn and J.-J. Desneux. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):91, 1968.

Four cases of hypersecreting villous tumors of the rectum were investigated. The volume of secretion did not depend on the surface area nor mass of the tumor. The position of the tumors in these cases was in the rectal bulb. The degree of hydration of the patient had a direct effect on the amount of secretion. The concentration of Na and Cl varied directly with the volume of secretion, while the bicarbonate concentration and pH were inversely proportional to the secretion. The excretion of K by the tumor was in linear relation to the size of the K pool of the body. The secretion of ammonia varied little. Little difference between plasma and secretory concentrations of ionized Ca, P, and Mg was observed.

2326 **NONSPECIFIC ULCER OF THE COLON.** *(E.)* Smithwick, W. (Johns Hopkins Hosp., Baltimore, Md.), R. P. Anderson and W. F. Ballinger. *Arch. Surg.* 97(1): 133-138, 1968.

The case histories of 3 patients (ages 17-58 years) with nonspecific colon ulcers are reviewed with a comparison of their symptoms, ulcer sites, and types of treatment being made with those of nonspecific ulcer patients in the literature. Abdominal pain and rectal bleeding were the chief symptoms; sigmoidoscopy failed to show the lesions. Excision of the ulcer or segmental resection was an adequate curative treatment; no recurrence is reported in these, or in any of the 82 cases given in the literature. The etiology of the condition is unknown.

2327 **PRODUCTION OF INFLAMMATORY AND ULCERATIVE LESIONS OF THE COLON IN RATS.** *(E.)* Auersperg, M. (U. Hosp., Helsinki, Finland) and C. Moeller. *Acta Chir. Scand.* 134:147-150, 1968.

Five groups of 70 male Sprague-Dawley rats, weighing 200-250 g were subjected to either vascular lesion, bowel obstruction, vascular lesion with bowel obstruction, or sham surgery, or were used as controls; they were killed 4, 10, and 21 days after surgery with macroscopic and microscopic examinations being made of excised colon tissue. Vascular lesions caused necrosis and/or ulcerations in 5 of 8 rats killed on the 4th or 10th postoperative day; 2 showed no macroscopic changes and 1 died 24 hr after surgery of hemorrhagic large bowel infarction. Vascular lesions with bowel obstruction caused death within 24 hours in 9 of 35 rats; 9 of 19 killed on the 4th or 10th day had necrosis or ulceration, 7 had mucosal edema with petechial hemorrhages, and 7 killed on the 21st postoperative day had no apparent mucosal changes except thickening of the wall and shortening of the bowel segment. Five rats with obstruction were killed on the 10th postoperative day and 5 on the 21st day; no macroscopic mucosa changes were noted at 10 days and only bowel wall thickening in 21-day rats. Gross mucosal alterations were only found in bowel segments with impaired circulation (vascular lesions).

2328 **MELANOSIS COLI.** *(E.)* Ghadially, F. N. and E. W. Parry. *Curr. Med. Drugs* 8(4):13-30, 1967.

The incidence of melanosis coli varies widely, and depends on the diligence of the search and on the criteria used for establishment of diagnosis. The condition occurs primarily in patients between the ages of 30 and 60 years. There is a relationship between the ingestion of anthracene cathartics by constipated patients and the development of melanosis coli. The entire colon may be affected, but the most frequent site of pigmentation is the caecum. Examination of diseased tissue reveals that pigmentation is restricted to the mucosa and submucosa; both regions appear edematous and are populated by large numbers of pigment-laden macrophages. No extracellular pigment is detectable. Electron microscopy reveals the presence of electron dense bodies in epithelial cells and macrophages. Melanin-like pigments may account for the granules. There is a marked morphological similarity between the pigment granules in melanosis coli and the lysosomes in other tissues; the presence of lipofucsin in pigment granules and lysosomes bears out the resemblance. The pigment granules are postulated to be cytolysomes. The sequence of events leading to their presence in melanosis are as follows: some noxious agent (anthracene) damages cell organelles which are sequestered off in membrane-bound bodies (cytolysomes) and digested by acid hydrolases; pigment granules are formed, containing among other things, lipofucsin derived from the oxidation of lipids originating in lipoprotein membranes of sequestered mitochondria and endoplasmic reticulum. Electron microscopy has also revealed the accumulation of glycogen in epithelial cells and muscularis mucosa, the appearance of giant multi-vesicular bodies, and the splitting of epithelial cell junctions. This junction splitting may be an early form of neoplastic lesion. This fits well with clinical evidence that melanosis coli and carcinoma are frequently associated.

2329 **CROHN'S DISEASE AND CARCINOMA OF COLON.** *(E.)* Perrett, A. D. (Radcliffe Infirm., Oxford, England), S. C. Truelove and G. R. Massarella. *Brit. Med. J.* 2:466-468, 1968.

Three cases of coexistent Crohn's disease of the colon and colon carcinoma are presented and the possibility of a genuine association is discussed. The patients were females, ranging in age from 34 to 72 years. In reviewing the literature, the frequency of colon carcinoma in 82 cases of Crohn's disease was 3.7%. While facts do not permit the assertion of a definite association between the two diseases, there is sufficient evidence to warrant further study of the question.

2330 **GRANULOMATOUS COLITIS: RECENT OBSERVATIONS.** *(E.)* McGarity, W. C. (Emory U. Sch. Med., Atlanta, Georgia), J. W. Ross, E. Bobo, J. S. Schroeder and J. L. Achord. *Ann. Surg.* 167(6):926-941, 1968.

Of 38 patients requiring surgery for colitis complications, 15 met the pathological criteria for the diagnosis of granulomatous colitis. The various operative procedures used were colectomy with ileostomy, segmental resection, subtotal colectomy with ileosigmoidostomy, abdominoperineal resection with sigmoid colostomy, and transverse and descending colon resection and abdominoperineal resection with hepatic flexure colostomy. Eight patients had ileal and colonic involvement; only the colon was affected in the remaining 7. Microscopic examination of the lesions showed edematous and fibrotic thickening of the colon wall, deep mucosal ulceration, transmural chronic inflammation, lymphoid hyperplasia, and multiple oblique fistulous tracts within the intestinal wall and mesentery; granulomatous inflammation was present in 11 cases. The recurrence rate is high after initial intestinal resection. In patients with diffuse or recurrent colon disease requiring total colectomy and ileostomy, the long-term prognosis is good.

2331 **RELATIONSHIP OF ANTIBIOTICS TO WOUND INFECTION AND ENTEROCOLITIS IN COLON SURGERY.** *(E.)* Azar, H. (U. Pittsburgh Health Ctr. Hosps., Pa.) and T. Drapanas. *Amer. J. Surg.* 115(2):209-217, 1968.

To explore the relationship of pre- and postoperative antibiotic administration to the incidence of wound infections and enterocolitis in the postoperative patient, a survey of 445 colon surgery patients was undertaken. Infections occurred in 18% of preoperatively-treated patients, 22% of pre- and postoperatively-treated patients, and 36% of postoperatively-treated patients. Neomycin, tetracycline, sulfonamide, chloramphenicol, penicillin, and broad spectrum antibiotics were used. A high incidence of enterocolitis was observed when penicillin with tetracycline or a variety of broad spectrum antibiotics was given postoperatively, and when patients received a number of antibiotic combinations pre- and postoperatively. The lowest incidence of enterocolitis occurred in patients in whom preoperative bowel asepsis was omitted. It is concluded that the use of careful mechanical cleansing of the colon in addition to a 24-36 hour period of preoperative preparation with neomycin and a sulfa preparation or tetracycline appears to offer the greatest protection against postoperative wound infections. When preoperative therapy is short, the incidence of postoperative enterocolitis is not increased. Routine administration of postoperative antibiotics to preoperatively treated patients increases the hazards of infection and enterocolitis and does not appear justified.

2332 **DIVERTICULITIS OF THE COLON.** *(E.)* Phillips, J. R. (Houston, Texas). *J. Abdom. Surg.* 10(6):149-150, 1968.

The frequency of diverticulosis increases with age, the greatest incidence occurring after 85 years; the number of cases that will develop into diverticulitis is unpredictable. Descending and sigmoid colon involvement are most frequent. The symptoms vary and do not necessarily parallel the severity of the pathology. Bowel habit changes, constipation alternating with diarrhea, a feeling of fullness, pain, and tenderness were the principal symptoms. Fever and leukocytosis were also noted. The case report of a 55-year-old male patient is presented; his entire left colon was resected and the transverse colon anastomosed to the rectosigmoid. During surgery an acutely inflamed gallbladder was observed. Cholecystectomy was performed to avoid postoperative complications. Although the patient is now doing well, 5 years after surgery, other abdominal complications are known to be associated with diverticulosis. The triad of diverticulosis, gallstones, and diaphragmatic hernia occur in 5-6% of all cases. The recurrence rate is 7% after limited sigmoid resection; primary left colectomy is recommended.

2333 **ABNORMALITY OF ANORECTAL PHYSIOLOGY IN HIRSCHSPRUNG'S DISEASE.** *(Rev.)(E.)* Howard, E. R. (Hosp. Sick Children, London, England). *Amer. J. Dig. Dis.* 13(5):432-433, 1968.

2334 **THE APPLICATION OF STUDIES *IN VITRO* TO THE MANAGEMENT OF HIRSCHSPRUNG'S DISEASE AND OF MEGACOLON IN ADULTS.** *(Rev.)(E.)* Shepherd, J. J. (Dept. Surg., Makerere U. Coll., Kampala, Uganda) and P. G. Wright. *Amer. J. Dig. Dis.* 13(5):434-441, 1968.

2335 **PATHOGENESIS AND SYMPTOMATOLOGY OF RECTAL ULCERS. [ORAL COMMUNICATION; FRENCH NATL. SOC. GASTROENT., JULY 3, 1967.]** *(Fr.)* Parturier-Albot, M., H. Miansarow, J. Guillard, F. Souyet and D. Kuon. *Presse Med.* 75(45):2281, 1967.

2336 **MULTIPLE COLONIC CARCINOMATA.** *(E.)* Pingree, J. H. (Salt Lake City, Utah), K. Reemtsma and R. D. Lewis. *Arch. Surg.* 95(6):937-939, 1967.

2337 **CHANGES IN THE BLOOD ELECTROLYTE BALANCE, TEMPERATURE AND CONCENTRATION OF ACTIVE HYDROGEN IONS IN PATIENTS WITH VILLOUS TUMORS OF THE RECTUM AND COLON.** *(Rus.)* Inoiatov, I. M. (Sci. Res. Lab. Proctol., Clin., Ministry Health RSFSR, Moscow, USSR) and V. F. Smirnov. *Klin. Khirurgiia* (1):30-33, 1968.

2338 **FORTY-EIGHT YEARS OF RECTITIS: CO-INCIDENCE OF DIGESTIVE AND ARTICULATORY DISORDERS.** *(Fr.)* Gilbrin, E., R. M. Sichere and J. Hubert. *Gaz. Med.* 74(28):5281-5286, 1967.

2339 **SEGMENTAL (GRANULOMATOUS) DISEASE OF THE COLON.** *(Rev.)(E.)* Crohn, B. B. (Mt. Sinai Hosp., New York City). *Israel J. Med. Sci.* 4(1):146-148, 1968.

2340 **A TECHNIQUE OF HEMICOLECTOMY FOR CARCINOMA OF THE RIGHT COLON.** *(E.)* Phelan, J. T. (Roswell Park Mem. Inst., N. Y. State Dept. Hlth., Buffalo) and S. H. Nadler. *Surg. Gynec. Obstet.* 126(2):353-360, 1968.

2341 **LONG-TERM SURVIVAL OF MOTHER AND SON WITH WIDESPREAD METASTATIC ADENOCARCINOMA OF COLON.** *(E.)* Snyder, W. (VA Hosp., Coral Gables, Florida), R. M. Clark and J. R. Rubini. *Cancer* 21(1):

2342 **COLIC NEUROMATOSIS.** *(Fr.)* Busson, A. (Paris) and J. Chome. *Arch. Franc. Mal. Appar. Dig.* 57(2):221-234, 1968.

2343 **SQUAMOUS-CELL CARCINOMA OF THE ANAL CANAL: A METASTATIC LESION. [CASE REPORT]** *(E.)* Ger, R. (Albert Einstein Coll. Med., Bronx, N. Y.) and J. Reuben. *Dis. Colon Rectum* 11(3):213-219, 1968.

2344 **THE PROBLEM OF LARGE INTESTINAL POLYPS.** *(Rev.)(Ger.)* Wittig, G. (Inst. Cancer Res., German Acad. Sci., Berlin-Buch, Germany) and G. P. Wildner. *Deutsch. Gesundh.* 23(18):817-825, 1968.

2345 **LEIOMYOMA OF THE ISCHIOANAL REGION: REPORT OF A CASE.** *(E.)* Kalima, T. V. (U. Helsinki, Finland) and P. Peltokallio. *Dis. Colon Rectum* 11(3):198-200, 1968.

2346 **HERNIA THROUGH THE FORAMEN OF WINSLOW [CASE REPORT].** *(E.)* Schwartz, A. (Hebrew U., Jerusalem, Israel) and M. M. Feuchtwanger. *Israel J. Med. Sci.* 4(1):117-121, 1968.

2347 **PREOPERATIVE PREPARATION AND POST-OPERATIVE CARE OF THE COLON.** *(E.)* Madden, J. L., I. Cohn, Jr., R. J. Freeark, R. P. Hummel and E. J. Poth. *Dis. Colon Rectum* 11(3):163-177, 1968.

2348 **CARCINOMA OF THE RECTUM AND COLON IN CHILDREN: REPORT OF THREE CASES.** *(E.)* Peltokallio, P. (U. Helsinki, Finland), V. Peltokallio and M. Pasila. *Dis. Colon Rectum* 11(3):193-197, 1968.

2349 **SURGICAL MANAGEMENT OF DIVERTICULITIS.** *(E.)* Chaitin, H. (Whitestone Hosp., Whitestone, N. Y.) *Geriatrics* 23(6):167-169, 1968.

2350 **PERFORATION OF THE TRANSVERSE COLON DURING BARIUM ENEMA AND AIR-CONTRAST STUDIES.** *(E.)* Yudis, M. (Hahnemann Med. Coll. & Hosp., Philadelphia, Pa.), A. Cohen and A. E. Pearce. *Amer. Surg.* 34(5):334-336, 1968.

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2352 **WHIPPLE'S DISEASE: REPORT OF A LONG TERM OBSERVATION.** *(Fr.)* Auche, Y. (St. André Hosp., Bordeaux, France), J. P. Bernard, J. Faivre and J. J. Dubarry. *Gaz. Med.* 74(28):5271-5278, 1967.

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2354 **DIVERTICULOSIS AND DIVERTICULITIS.** *(E.)* Malow, L. (Chicago, Ill.). *Amer. J. Proct.* 19(3):181-184, 1968.

2355 **LAPAROTOMY FOR "OVARIAN TUMORS" IN UNSUSPECTED CARCINOMA OF THE COLON.** *(E.)* Harcourt, K. F. (U. Oregon Med. Sch., Portland) and D. L. Dennis. *Cancer* 21(6):1244-1246, 1968.

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2357 **RARE CASES OF LARGE BOWEL PERFORATION.** *(Rus.)* Khodzhaev, N. S. (Kirov Dist. Hosp., Tashkent, USSR) and S. Ie. Bargman. *Med. Zh. Uzbek.* (12):66, 1967.

2358 **NECROSIS OF THE COLON AND THE RECTUM COMPLICATING ABDOMINAL AORTIC RESECTION.** *(E.)* Bertelsen, S. (Rigshosp., Copenhagen, Denmark) and K. Egeblad. *Acta Chir. Scand.* 134(2):151-156, 1968.

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2363 **ELECTROLYTE SECRETION BY VILLOUS TUMORS OF THE RECTUM. [ORAL COMMUNICATION; FRENCH NATL. GASTROENT. SOC., PARIS, SEPT. 30, 1967.]** *(Fr.)* Cremer, M. (Bruggman Hosp., Brussels, Belgium), R. Kahn and J. J. Desneux. *Biol. Gastroent.* 1(1): 91, 1968.

2364 **SOME RECENT ASPECTS OF PATHOGENESIS AND TREATMENT OF ANAL FISSURES.** *(Fr.)* Arnous, J. (Paris, France). *Acta Gastroent. Belg.* 31(2): 126-133, 1968.

2365 **STOOL AND URINE CONTENT OF PUTREFACTION PRODUCTS IN CHRONIC COLITIS PATIENTS.** *(Rus.)* Askarov, A. A. (Tashkent Med. Inst., USSR), K. Kh. Khadzhiev and Sh. Zufarov. *Med Zh. Uzbek.* (1):47-49, 1968.

2366 **PROGNOSIS OF GRANULOMATOUS COLITIS WITH ONSET IN CHILDHOOD.** *(E.)* Korelitz, B. I. (Mount Sinai Hosp., New York City). *J. Mount Sinai Hosp. N. Y.* 35(1):1-13, 1968.

2367 **ON 200 CASES OF CANCER OF THE RECTUM.** *(Fr.)* Schneiter, R. (Surg. Clin., U. Geneva, Switzerland). *Helv. Chir. Acta* 35(1/2):252-259, 1968.

2368 **CARCINOID TUMORS OF THE RECTUM.** *(Fr.)* Gross, M. (Surg. Serv., U. Lausanne, Switzerland). *Helv. Chir. Acta* 35(1/2):239-248, 1968.

2369 **CANCER OF THE TRANSVERSE COLON.** *(Por.)* Gentil, F. (Sao Paulo Assn. Prevention Cancer, Brazil), S. Massuda and G. Ogusuku. *Rev. Brasil Cir.* 55(7/8):64-74, 1968.

2370 **COLON DIVERTICULOSIS–DIVERTICULITIS.** *(Ger.)* Akovbiantz, A. (Surg. Clinic, U. Zurich, Switzerland), P. Aeberhard and S. Arma. *Praxis* (11):375-379, 1968.

2371 **CARCINOMA OF THE RECTUM.** *(Ger.)* Morgan, C. N. (St. Bartholomew's & St. Mark's Hosp., London, England). *Helv. Chir. Acta* 35(1/2):224-231, 1968.

2372 **DIAGNOSIS OF TUMORS OF THE LARGE INTESTINE IN ASYMPTOMATIC PATIENTS.** *(It.)* Feo, F. *Minerva Med.* 59(25):1469, 1968.

2373 **RADIOLOGIC DIAGNOSIS OF CANCER OF THE COLON AND RECTUM.** *(Fr.)* Pringot, J. (U. Cathol. Louvain, Belgium) and P. Bodart. *Louvain Med.* 87(4):283-299, 1968.

2374 **FECAL CONTINENCE FOLLOWING COLECTOMY AND ILEOANAL ANASTOMOSIS THROUGH EXTRAMUCOSAL RECTAL TUBE.** *(E.)* Levin, P. (Los Angeles, Calif.) and E. W. Fonkalsrud. *J. Surg. Res.* 8(5):234-238, 1968.

2375 **PROGRESS TOWARD SELECTIVE TREATMENT OF ENTERIC DISORDERS IN COLITIC SYNDROMES.** *(Fr.)* Wiel, R. *Gaz. Med. France* 75(11): 2340-2343, 1968.

2376 **PROLAPSE RECTUM.** *(E.)* Johari, S. L. *Bombay Hosp. J.* 9(2):29-35, 1967.

2377 **EFFECTIVENESS OF ALIMENTARY THERAPY IN CHRONIC COLITIS AND ENTEROCOLITIS.** *(Rus.)* Iekisenina, N. I., T. N. Zitler, L. M. Ivanova, L. M. Krums, T. I. Kudinova, L. P. Miakova, R. I. Chanysheva and V. A. Shaternikov. *Vop. Pit.* 27(1):55-60, 1968.

2378 **MICROCOLON IN NEWBORN INFANTS WITH INTESTINAL OBSTRUCTION: ITS CORRELATION WITH THE LEVEL AND TIME OF ONSET.** *(E.)* Berdon, W. E., D. H. Baker, T. V. Santulli, R. A. Amory and W. A. Blanc *Radiology* 90(5):878-885, 1968.

2379 **SQUAMOUS-CELL CARCINOMA OF THE CAECUM FOLLOWING OVARIAN ADENOCARCINOMA.** *(E.)* Pemberton, M. (Enfield Hosps., Chelsea, England) and J. Lendrum. *Brit. J. Surg.* 55(4):273-276, 1968.

2380 **PELVIRECTAL FISTULA TREATED BY TEMPORARY COLOSTOMY.** *(E.)* Williams, A. F. (Oldham Hosp. Group, England). *Brit. J. Surg.* 55(3): 219, 1968.

See also abstract nos.: 1805,1854,1865

381 PROGNOSTIC VALUE OF THE SERUM PROTEINS DURING SEVERE ATTACKS OF LCERATIVE COLITIS. *(E.)* de Dombal, F. T. (Gen. Infirm., eeds, England). *Gut* 9(2):144-149, 1968.

erial electrophoretic studies of the serum proteins were perormed on 46 patients (21 males and 25 females, mean age 5.4 yr) suffering from severe attacks of ulcerative colitis, 25 f whom required surgical treatment. All patients showed abolute decreases in serum albumins (to 2.97-3.34 g% compared o 4.54 g% in controls) and increases in serum alpha-globulins to 1.10-1.12 g% compared to 0.69 g% in controls). However, hese proteins were of no prognostic value. The gamma-globlins, on the other hand, varied widely, both above and below ormal levels, and showed significant changes during hospitalzation. Of the 21 patients with stable high or rising gammalobulin levels, 20 survived the acute attack on conservative nanagement, while of the 25 patients with falling or initially ery low gamma-globulin levels, 24 came to emergency surgery. he importance of measuring absolute increases and decreases emphasized, as is the need for serial studies. Thus, those who nanaged on conservative treatment included 5 with initially ubnormal gamma-globulin levels which rapidly rose, and the atients requiring surgery included one with a very high initial amma-globulin level which rapidly dropped. Measured proprly, the gamma-globulin levels are valuable for prognostic urposes, and are also of interest in connection with the hypohesis that autoimmune phenomena play a role in the pathogensis of ulcerative colitis.

382 RADIOLOGICAL SIGNS OF ULCERATIVE COLITIS: ASSESSMENT OF THEIR RELIBILITY BY MEANS OF OBSERVER VARIATION STUDIES. *E.)* Geffen, N. (Gen. Infirm., Leeds, England), A. Darnborough, . T. de Dombal, G. Watkinson and J. C. Goligher. *Gut* 9(2): 50-156, 1968.

he films from a single barium enema examination in 20 paents with confirmed ulcerative colitis were evaluated indeendently by two radiologists who noted the presence or abence of the various signs of ulcerative colitis in each large inestinal segment on the "filled" and "post-evacuation" films f each patient. Comparison between the findings of the two adiologists showed that some of the most common and freuently relied on signs are relatively unreliable. There was not ne radiological sign on which the two radiologists were in omplete agreement as to its presence or absence in all segents, and many of the signs were only noted on a few occaons. Thus, although absent haustration, smooth contour, nd ulceration were recorded by both radiologists on the filled lm in 45, 23 and 18 segments, resp., the signs were definitely bsent in 25, 38 and 51 segments, resp., and the two radiolgists disagreed on 7, 16 and 8 segments. Marked disagreement was also found as to the presence or absence of coarse erration (present in 10 segments, absent in 54 segments, and 3 segments in disagreement) and swollen mucosa (present in segments, absent in 57, and 11 segments in disagreement). n the post-evacuation films, abnormal haustra and longitudinal olds were recorded by both radiologists in 35 and 15 segments, esp., but were definitely absent in 18 and 38 segments, while in each case 5 segments could not be agreed on. Even with regard to the general signs of decreased caliber and decreased distensibility, these were found by both radiologists in 27 segments, were definitely absent in 40 segments, and were reported by one radiologist but not the other in 10 segments. As a result, the following signs were separated out as being both frequent and reliable, with an agreed incidence of greater than 10% (11.7-60.3%) and an observer variation of less than half the agreed incidence (usually about 7%); abnormal haustration on post-evacuation film, abnormal or absent haustration on filled film, decreased caliber, decreased distensibility, decreased length, longitudinal folds on post-evacuation film, ulceration on filled film, decreased tone, polyps on post-evacuation film, and fine serration. Smooth contour, coarse serration, and edematous mucosa, on the other hand, were reported frequently (11.7-29.8%) but were unreliable since the observer variation was 14.3-20.8%. There were even a few signs which were never agreed to be present by both observers but which one or the other would occasionally claim to have seen (e.g., reticular or coarse reticular pattern, with an observer variation of 18.3%). It is noteworthy that most of the useful and reliable signs were general signs, such as shortening or narrowing of the colon, while most of the least reliable signs were signs reflecting individual opinions. Any diagnosis of ulcerative colitis on radiological grounds should therefore be based on the presence or absence of the reliable signs listed above, with the possible addition of double contour (agreed incidence of 9.1% and observer variation of 3.9%).

2383 RADIOLOGICAL APPEARANCES OF ULCERATIVE COLITIS: AN EVALUATION OF THEIR CLINICAL SIGNIFICANCE. *(E.)* de Dombal, F. T. (Gen. Infirm., Leeds, England), N. Geffen, A. Darnborough, G. Watkinson and J. C. Goligher. *Gut* 9(2):157-163, 1968.

The radiological signs from 340 barium enemas in 278 patients were compared with the clinical pattern of ulcerative colitis in each case in order to evaluate the possibility of arriving at a prognosis on the basis of X-ray findings. For this purpose, the presence or absence of each reliable sign (as defined in the previous paper) was correlated with the duration of colitis symptoms, the activity of the disease at the time of examination, the short-term prognosis, and the long-term prognosis (condition at last examination). The incidence of ulceration, for example, was inversely proportional to the duration of follow-up (43% in patients examined during the 1st year and 22% in patients examined after a history of more than 10 yr) and directly proportional to the severity of the attack (10% during remissions and 59% during severe attacks). In relation to short-term prognosis, ulceration was found in 33% of films from patients who improved during the following year, 22% of those with a fair prognosis, and 52% of films from "medical failures" (patients who died of colitis or came to emergency surgery during the following year). There was no relation, however, between the incidence of ulceration (32-36%) and the long-term prognosis. Taking the clinical parameters one at a time, ulceration, fine serration and double contour were more commonly seen in the early stages of ulcerative colitis, while a short narrow colon with decreased distensibility and longitudinal folds was more frequently seen in the late stages of the disease. The incidence of many signs was totally unrelated to the activity of the disease process. However, a short colon was associated with inactive disease, while ulceration and a double contour were associated with severe attacks of colitis. A poor short-term prognosis was associated with 5 signs: decreased tone, ulceration, fine serration, double contour, and polyps on the post-evacuation film. When 3 or more of these signs were present, two thirds of the patients died or came to surgery within a year. No single sign or combination of signs provided an accurate long-term prognosis in the individual case. The factor which determines the long-term prognosis is the extent of involvement of the colon and this, contrary to what is commonly believed, can vary with time. Thus, serial barium enemas in 110 patients revealed that the disease remained limited to the rectum in 23 of 38 patients, followed for 1-8 yr, in whom the disease was limited to the rectum initially; in 15 cases, however, there was proximal extension of the disease process. Similarly, among 50 patients with substantial involvement of the colon on initial examination, who were followed for 1-13 yr, 9 showed regression of the disease process and 14 showed further spread. Regression was also observed in 3 of 22 patients who showed total involvement of the colon on first examination. Extension of the disease process generally implies a worsening of the long-term prognosis.

2384 EXPERIMENTAL STUDIES ON THE IMMUNOPATHOLOGY OF THE COLON. *(Ger.)*

Mitschke, H. (Inst. Path., U. Hamburg, Germany) and J. Kracht. *Beitr. Path. Anat.* 136(3):261-283, 1968.

In experiments designed to test the hypothesis that ulcerative colitis is an autoimmune disease, antigen was prepared by washing the colon of rabbits or rats with saline and then scraping off the upper layers of the colonic mucosa, leaving most of the submucosa and all of the muscularis; these scrapings were then mixed with Freund's adjuvant and tested for their ability to produce intestinal lesions and/or homologous or heterologous precipitating antibodies. Immunization with homologous colonic mucosa for up to 20 weeks yielded chronic ulcerative inflammation of the cecum in 53 of 70 rats. However, no precipitating antibodies could be detected by the agar-gel diffusion technique, and all of the specimens studied showed the presence of *Salmonella enteritidis.* This suggests that these lesions, which also sometimes occur spontaneously in rats, are of bacterial origin. Immunization of rabbits with homologous colonic mucosa for periods of as long as a year led to a very slow development of precipitating antibodies in only 2 of 12 animals. Three other rabbits (lacking precipitating antibodies) developed lesions in the colon, but these lesions were not typical of autoimmune diseases. Heterologous immunization of rabbits with rat colonic mucosa led to the production of precipitating antibodies, but no detectable lesions in the rabbit intestines. When rabbit antiserum produced against rat colon was injected back into rats (intracardially), one of the 30 animals developed simultaneous ulcers in the stomach and colon, which were not considered to be comparable to the lesions of ulcerative colitis. Direct and indirect fluorescence studies using anti-colon antisera were successful in visualizing the antigenic, predominantly PAS-positive structures in the crypt epithelia of the rat and rabbit colon. It is concluded, however, that a model experimental disease with lesions resembling those of human ulcerative colitis has still not been produced.

2385 DISEASES ASSOCIATED WITH ULCERATIVE COLITIS AND CROHN'S DISEASE. *(E.)*

Hammer, B. (Frenchay Hosp., Bristol, England), P. Ashurst and J. Naish. *Gut* 9(1):17-21, 1968.

In an attempt to explore the possibility of familial susceptibility, the prevalence of polyarthritis, eczema, psoriasis, asthma, hay fever and thyroid disease, some of which are thought to be allergic or autoclastic in nature, was determined in a group of 198 patients with ulcerative colitis, 45 patients with Crohn's disease, and 1632 of their first-degree relatives, as well as in a control group selected at random from the hospital population. All were of British stock. Interviews and responses to mailed questionnaires revealed a history of eczema in 23-33% of the patients, 7% of controls, 2.9-5.9% of the relatives of the patients, and 1.2% of the relatives of hospitalized controls. Similarly, hay fever was reported by 12-18% of the patients, 6% of controls, 2.6-3.5% of the patients' relatives and 1.3% of control relatives, and polyarthritis was reported by 12-22% of patients, 2% of controls, 2.2-3.9% of the patients' relatives and 1.1% of control relatives. These differences are statistically significant, and reveal an association between enterocolitis and these allergic diseases which is stronger for Crohn's disease than for ulcerative colitis. The number of cases of psoriasis among the patients was too low for analysis, but it may be significant that psoriasis was reported by 2.3% of the relatives of patients with Crohn's disease compared to 0.3% of control relatives and 0.7% of the relatives of patients with ulcerative colitis. No significant differences were found in the prevalence of asthma and thyroid disease. Among the 1376 relatives of the 198 patients with ulcerative colitis, there were 8 confirmed cases of ulcerative colitis and 2 of Crohn's disease. These results support the concept of a genetic predisposition to all of the associated diseases.

2386 CONSERVATIVE (SUPPORTIVE) TREATMENT OF SEVERE ULCERATIVE COLITIS: METHODS AND RESULTS. *(E.)*

Groen, J. J. (Hadassah U. Hosp., Jerusalem, Israel) and D. Birnbaum. *Israel J. Med. Sci.* 4(1): 130-139, 1968.

Among 27 consecutive cases of severe ulcerative colitis who were given supportive therapy over an 8-yr period (follow-up of at least 2 yr), 14 were clinically cured (completely well without drugs for at least 2 yr), 6 were considerably improved, 4 improved but required continued steroid treatment, 2 were lost to follow-up after considerable improvement, and one committed suicide. All of these patients initially had diarrhea, a history of fever, anemia and hypoalbuminemia, proctoscopic evidence of mucosal edema, hyperemia and ulceration, involvement of at least half the colon on X-ray, and histological evidence of ulcerative colitis on rectal biopsy. Treatment was based mainly on supportive and reeducative psychotherapy, combined with blood transfusions, water and electrolyte replacement, iron, a diet high in vitamins, and corticosteroids plus ACTH and Durabolin; some of the patients received small amounts of salazopyrine, papaverine, belladonna, sedatives or tranquilizers from time to time. The psychogenic factors in ulcerative colitis are emphasized, and interpersonal conflict situations preceding the onset of ulcerative colitis in 19 of the 27 cases are tabulated. The doctor-patient relationship which can best contribute to the improvement and eventual cure of ulcerative colitis is described in detail. In view of the favorable results obtained and the advantage of preserving the natural defecation function, conservative treatment is advocated rather than colectomy and ileostomy even in the most serious cases.

2387 **REGIONAL ENTERITIS OF THE COLON: A CLINICAL AND PATHOLOGIC COMPARISON WITH ULCERATIVE COLITIS.** *(E.)* Farmer, R. G. (Cleveland Clin. Found., Ohio), W. A. Hawk and R. B. Turnbull, Jr. *Amer. J. Dig. Dis.* 13(6):501-514, 1968.

Retrospective correlation of the clinical, surgical and pathological findings in 151 patients with primary ulcerative-inflammatory disease of the colon in the absence of significant small bowel disease, operated on during the period 1950-64 and originally diagnosed as ulcerative colitis, revealed 48 cases (22 men and 26 women) of mucosal ulcerative colitis, 87 cases (43 men and 44 women) of transmural colitis or regional enteritis of the colon (48 with noncaseating granulomas and 39 without granulomas), and 16 cases which could not be classified. Among the 87 patients with regional enteritis, 42 showed histological evidence for some involvement of the distal ileum. With regard to the pathological findings, diffuse mucosal ulceration, pseudopolyposis, and shortening of the colon were more characteristic of ulcerative colitis. Crypt abscesses were frequently seen but were not pathognomic of ulcerative colitis. Regional enteritis of the colon was characterized by segmental involvement, serositis, rectal abscesses or fistulas (in 43% compared to 10% of the ulcerative colitis group), mesenteric lymphadenopathy, inflammatory masses, and strictures. Carcinoma of the colon was found at operation in 8 of 48 ulcerative colitis patients and in none of those with regional enteritis of the colon. Atypical findings at proctosigmoidoscopy (patchy irregular involvement, with areas of normal mucosa between the ulcers, instead of the diffuse and uniformly involved mucosa in ulcerative colitis patients) were common in cases of regional enteritis, as were atypical X-rays (irregular, disproportionate, segmental involvement with deep strictures and fissures). Multiple operations and recurrent ileitis after colectomy were more common in regional enteritis than in ulcerative colitis, and the prognosis was generally poorer. Although the incidence of diarrhea was about the same in the two groups, rectal bleeding occurred in 30 of 48 with ulcerative colitis and only 45 of 87 with regional enteritis. Toxic dilatation of the colon was also more frequent in ulcerative colitis. A weight loss of more than 10 pounds before surgery, however, was only reported by 5 patients in the ulcerative colitis group compared to 62 of the regional enteritis group. A comparison of the granulomatous and nongranulomatous cases of regional enteritis revealed no significant difference in age, sex, duration and severity of symptoms, or incidence of weight loss, abdominal pain, diarrhea or arthritis. Atypical proctosigmoidoscopic and X-ray findings, rectal bleeding and rectal fistulas, however, were encountered in 58-67% of the granulomatous group and 23-40% of the nongranulomatous group, while toxic megacolon was noted in 8% and 26%, resp. There is thus some evidence that nongranulomatous regional enteritis of the colon is closer pathologically and clinically to ulcerative colitis.

2388 **HISTOCHEMISTRY OF THE COLONIC EPITHELIAL MUCINS IN NORMAL SUBJECTS AND IN PATIENTS WITH ULCERATIVE COLITIS: A QUALITATIVE AND HISTOPHOTOMETRIC INVESTIGATION.** *(E.)* Greco, V. (Inst. Med. Path., U. Rome, Italy), G. Lauro, A. Fabbrini and A. Torsoli. *Gut* 8(5):491-496, 1967.

The goblet cells of the large intestine were studied histochemically (Alcian-blue staining) and histophotometrically (Lison histophotometer with a Balzer interference filter) in 15 specimens of mucosa from 13 normal subjects and in 19 specimens from 10 patients with ulcerative colitis. In the normal cecum and colon other than the sigmoid, goblet cells with neutral mucins were concentrated in the lower two-thirds of the crypts; these cells were rare in the sigmoid, however, indicating differences in the rate of goblet cell maturation in the various segments of the large intestine. The strongly acid mucins were found mainly in the basal and intermediate parts of the crypts, while the weakly acid mucins were in the neck of the glands and in the goblet cells at the luminal surface. There was a larger intracellular content of acid mucins in the goblet cells of the sigmoid, at all levels of the crypts, and the sulfomucins were concentrated in the central parts of the cells. In ulcerative colitis, the histochemical changes could be correlated with the severity of the histological lesions, suggesting that they are the result of a distinctively increased turnover rate of the goblet cells. In specimens showing mild histological changes (lympho- and plasmocytic infiltration of the lamina propria), the sigmoid showed large numbers of goblet cells with neutral mucins. In the other segments, the neutral goblet cells were no longer confined to the lower two-thirds of the glands but were distributed along the entire length. There was also an increase in superficial weakly-acid goblet cells, compared to controls, indicating more rapid turnover. Histophotometrically, there was an increased content of intracellular acid mucins, especially in segments other than the sigmoid, while in the sigmoid there was both a relative and an absolute increase in the sulfomucins. In specimens showing severe histological changes (abscesses, destruction of the crypts and ulceration of the mucosa), there was a significant decrease and even a total disappearance of the neutral goblet cells, suggesting a slowing down of cellular turnover. There was also an increase in the intracellular mucin content of the cecum and proximal colon, probably indicating that these segments have a greater functional capacity than the sigmoid; this difference may be due to a lesser production of mucin under basal conditions.

2389 **IMMUNOLOGIC MANIFESTATIONS OF HEALTHY CONSANGUINEOUS RELATIVES OF PATIENTS SUFFERING FROM ULCERATIVE COLITIS.** *(E.)* Polcák, J. (2nd Med. Clin., U. Brno, Czechoslovakia) and M. Skalova. *Amer. J. Proctol.* 19(3):197-203, 1968.

Immunological studies using passive hemagglutination tests and the collodion agglutination reaction with an extract of fetal colonic mucosa revealed antibodies to colonic tissue in 40.7% of 157 healthy blood-relatives of patients with ulcerative colitis, 5.8% of 112 control patients with other diseases, and none of 20 healthy volunteers. Antinuclear globulins were detected in 57.5% of 106 healthy blood-relatives of ulcerative colitis patients, and in none of 100 other subjects (20 healthy volunteers and 80 patients with various other diseases). The "P phenomenon" (vasoconstrictor effect on rat mesentery) was shown by the sera of all 61 ulcerative colitis patients, 23 of 48 healthy blood-relatives, and none of 26 healthy volunteers. It is of interest that none of the fathers showed positive reactions in any of the tests. Also, positive tests for anticolonic antibodies were obtained in 20 of 32 mothers and 32 of 61 daughters and sisters, compared to only 12 of 39 sons and brothers; antinuclear globulins were detected in 27 of 29 mothers and 27 of 38 daughters and sisters, compared to 5 of 18 sons and brothers; and the vasoconstrictor reaction was obtained in 11 of 14 mothers and 9 of 14 daughters and sisters, compared to 3 of 11 sons and brothers. It is suggested that genetic factors may play a role in the pathogenesis of ulcerative colitis.

2390 **RECTAL BIOPSY AS AN AID TO CANCER CONTROL IN ULCERATIVE COLITIS.** *(E.)* Morson, B. C. (St. Mark's Hosp., London, England) and L. S. C. Pang. *Gut* 8(5):423-434, 1967.

The incidence and extent of epithelial changes suggestive of precancer or carcinoma *in situ* in rectal biopsies and colectomy specimens removed from patients with diffuse ulcerative colitis, with and without malignant change, were correlated retrospectively with the development of large intestinal malignancy. Among 23 colectomy specimens removed from patients with both total colitis and large intestinal cancer, all showed extensive precancerous changes involving large areas of the mucosa; 19 of the 23 had a history of ulcerative colitis of >10 yr. Among 172 colectomy specimens removed from ulcerative colitis patients without cancer (134 with total and 38 with subtotal colitis), 12 (all from patients with total colitis, 9 of whom had a history of >10 yr) showed precancer which was highly variable in extent. Among 148 consecutive rectal biopsies of patients with ulcerative colitis, 16 (all from the 54 patients who had a subsequent colectomy) showed precancer; all had total colitis, and 15 of these patients had a history of more than 10 yr. The 38 patients with negative rectal biopsies also showed no precancerous changes in the subsequent colectomy specimen. In 9 patients (2 men and 7 women) with total colitis and a history of 8-46 yr (>10 yr in 8 of 9), rectal biopsies revealed precancer: 7 in flat mucosa and 2 in polypoid lesions. As a result, all 9 were subjected to surgery; one had an inoperable sigmoid tumor and 4 of the other 8, all of whom received total proctocolectomy, had invasive carcinoma. The extent and severity of the precancerous changes in the colectomy specimens varied widely, and only one of the 8 had severe colitis. It is concluded that rectal biopsy, in conjunction with clinical and radiological studies, may be helpful in the recognition of the patient with ulcerative colitis who has entered a precancerous phase. The recognition of precancer in a rectal biopsy is associated with a high incidence of suspected or unsuspected invasive carcinoma in the more proximal bowel. Regular rectal biopsy, at annual intervals, is therefore recommended for all patients with a long history of total colitis, and total proctocolectomy is urged for all those in which precancerous changes are detected. The morphology of precancer in colitis and the histological and cytological criteria for the diagnosis of precancer in colectomy specimens and rectal biopsies are described in detail.

2391 **COMPARATIVE STUDIES ON: INTESTINAL DISACCHARIDASE ACTIVITIES, ISOENZYMES OF LACTIC ACID, MALIC ACID DEHYDROGENASES, ALKALINE PHOSPHATASE AND UNSPECIFIC ESTERASE IN ULCERATIVE COLITIS.** *(E.)* Kojecky, Z. (Palacky U. Med. Sch., Olomouc, Czechoslovakia) and Z. Matlocha. *Amer. J. Proctol.* 19(3):204-209, 1968.

Biochemical studies on 25 biopsy samples of jejunal mucosa from 15 patients with mild ulcerative colitis and 3 patients in whom total colectomy and ileorectal anastomosis had been carried out revealed a significant decrease in lactase and invertase activity in patients with ulcerative colitis, while the maltase and trehalase activities were essentially normal. As a result, the maltase:invertase:lactase ratio was 28:4:1 compared to 9:2:1 in normal subjects. The cellobiase activity was also below normal in ulcerative colitis patients. Electrophoresis on polyamide gel revealed no difference, however, in the number of fractions of lactic and malic dehydrogenase, alkaline phosphatase and nonspecific esterase. In all cases, homogenates of intestinal mucosa showed 4 lactic dehydrogenase and 4 malic dehydrogenase fractions, compared to 3 and 7 in the blood serum, resp. With regard to nonspecific esterase, the major fraction in the intestinal mucosa was the rapidly migrating fraction, while in the blood serum the most distinct fraction was the slowly migrating one. Patients with decreased lactase activity in the small intestine tended to show a flat blood sugar curve after administration of lactose. It is suggested that the small intestine is involved even in mild forms of ulcerative colitis, resulting in malabsorption of disaccharides and consequent stimulation of bacterial growth in the colon; this increased flora may release products which irritate the large intestinal mucosa and aggravate the colitis.

2392 **CAUSES AND FREQUENCY OF MILK INTOLERANCE IN PATIENTS WITH ULCERATIVE COLITIS.** *(Fr.)* Tachev, T. (Inst. Postgrad. Med. (ISUL), Sofia, Bulgaria), N. Nedkova-Bratanova, A. Krasteva and V. Petrounov. *Acta Gastroent. Belg.* 31(2):149-154, 1968.

Among 100 patients with ulcerative colitis examined during the period 1964-67, 66 showed intolerance to fresh milk and 31 of these also showed intolerance to yogurt and other milk products. Milk intolerance was particularly common in the 78 patients with chronic relapsing forms of the disease, associated with pancreatic dysfunction (50 cases), hypoalbuminemia (20), gastric hyposecretion (70), gastric hypersecretion (20), and disturbances in small intestinal lipid absorption (72) or digestion (84). Passive hemagglutination tests by the method of Boyden, using α-lactalbumin as the antigen, were carried out in 30 patients, including 19 with milk intolerance; positive titers were obtained in 15 of the 19 (geometric mean 1:9.26) and in 9 of the 11 others (geometric mean 1:6.41). Milk intolerance is ascribed mainly to allergy, with a smaller proportion being due to secondary lactase deficiency. It is also pointed out that milk intolerance can be an aggravating factor in the pathophysiology of ulcerative colitis, which should be kept in mind when prescribing diets for such patients.

2393 **INCIDENCE OF LACTASE DEFICIENCY IN ULCERATIVE COLITIS.** *(E.)* Newcomer, A. D. (Mayo Clin., Rochester, Minn.) and D. B. McGill. *Gastroenterology* 53(4):890-893, 1967.

Among 24 consecutive patients (15 males and 9 females, 15-70 yr old) hospitalized for idiopathic ulcerative colitis of 0.2-21.0 yr duration (mean 4.7 yr), including 15 with diffuse disease and one with a complicating carcinoma of the transverse colon, the mean disaccharidase activity (lactase, maltase and sucrase) as determined by the method of Dahlqvist in biopsy specimens obtained from the ligament of Treitz was not significantly different from that in 100 healthy Caucasian volunteers (50 men and 50 women, 20-63 yr old). The lactase activity ranged from 0 to 7.3 (mean 3.0) in the patients and from 0 to 11.1 (mean 3.1) in controls, and there was no correlation between lactase activity and the duration of ulcerative colitis. Isolated lactase deficiency was found in 2 of the patients and 6 of the controls. Among the patients, one of the 2 with lactase deficiency and 3 others had intolerance to milk. Biopsies were histologically normal in all 17 cases examined, except for slightly flat villi in one case. Despite these results, trial removal of milk from the diet is recommended in patients with ulcerative colitis.

2394 **SERUM PROTEINS IN ULCERATIVE COLITIS: ELECTROPHORETIC PATTERNS IN THE INFERIOR MESENTERIC ARTERY AND VEIN.** *(E.)* de Dombal, F. T. (Gen. Infirm., Leeds, England). *Gut* 8(5): 482-485, 1967.

Comparison of the electrophoretic patterns in samples of blood removed during surgery from the inferior mesenteric artery and the inferior mesenteric vein of 10 patients with severe ulcerative colitis and 9 controls with rectal or colonic cancer revealed a significant increase in venous α_2-globulins and a decrease in γ-globulins, compared to arterial levels, in all 10 ulcerative colitis patients but in none of the controls. In other words, the venous/arterial ratio was significantly higher than 1.0 for the α_2-globulins and significantly below 1.0 for the γ-globulins only in the 10 ulcerative colitis patients. These results suggest strongly that there is a local production or release of α_2-globulins and a fixation or destruction of γ-globulin by the inflamed colon.

2395 **MEDICAL MANAGEMENT OF ULCERATIVE COLITIS.** *(E.)* Truelove, S. C. (Radcliffe Infirm., Oxford, England). *Brit. Med. J.* 2:605-607, 1968.

Research into the dietary relationships of ulcerative colitis have led to the discovery that 20% of ulcerative colitis patients derive substantial benefit from milk-free diets. Immunological studies, when paralleled with clinical, sigmoidoscopic, and histological observations failed to show any correlation between immunological findings and clinical responses. Disaccharidase assays of 32 small intestine biopsy specimens revealed lactase deficiency in 46%; however, "double blind" feeding studies showed that lactose did not increase colitic symptoms and that any benefits derived from milk-free diets in ulcerative colitis patients were unattributable to lactase deficiency. The complications of ulcerative colitis consist of those arising around the inflamed colon and rectum (perforation, dilatation, massive hemorrhage, and fistulas) and those occurring in extra-colonic sites (skin eruptions, aphthous mouth ulcerations, uveitis, arthritis of the big joints, ankylosing spondylitis, and erythema). The remote systemic complications respond to corticosteroid therapy. The liver may also be affected; chronic hepatitis may progress to cirrhosis. Deep venous thrombosis is common during ulcerative colitis attacks. Colon carcinoma is also a chronic complication. Radical surgery is the only means of effecting a permanent cure. Preventive surgery eliminates the risk of colon carcinoma and is indicated in patients with factors associated with high cancer risk.

2396 **CRITICAL FOLLOW-UP OF SURGICALLY TREATED ULCERATIVE COLITIS.** *(E.)* Myers, R. T. (Bowman Gray Sch. Med., Wake Forest, N. C.) and F. Hightower. *Ann. Surg.* 167(6):920-925, 1968.

Ninety-one surgically treated ulcerative colitis patients, ages 14-72 years, were studied and the data analyzed. The indications for surgery were failure to respond to medical therapy, fulminating ulcerative colitis associated with toxic dilatation of the colon, colonic perforation, and uncontrolled hemorrhage. Total colectomy with ileostomy is the treatment of choice in patients with uncomplicated chronic ulcerative colitis. The overall mortality was 11 deaths, 6 having had one-stage procedures done, and the rest having died after the initial step in a two-stage treatment. All deaths except two were associated with sepsis; hepatic failure and cardiac failure caused death in the other two patients. Late deaths occurred in 9 patients; the causes were colon carcinoma, intestinal obstruction, and factors unrelated to the previous surgery or disease. Skin irritation around ileal stoma was a frequent complication following total colectomy, occurring in 30% of the patients; intestinal obstruction was the next most frequent complication. There were 6 cases of associated carcinoma, 3 of whom have expired. It appears that despite a rather high, late complication rate, that if the patient survives the initial procedure for chronic ulcerative colitis, the chance of recovery and good rehabilitation is excellent.

2397 **THE MANAGEMENT OF ULCERATIVE COLITIS.** *(Rev.)(E.)* Watkinson, G. (Gen. Infirm., Leeds, England) and F. T. de Dombal. *Scot. Med. J.* 13(4):133-143, 1968.

2398 **SOME CONSIDERATIONS OF IMMUNOLOGIC MECHANISMS IN NONSPECIFIC ULCERATIVE COLITIS.** *(Rev.)(E.)* Kraft, S. C. (U. Chicago Sch. Med., Ill.) and J. B. Kirsner. *Israel J. Med. Sci.* 4(1):122-129, 1968.

2399 **SURGICAL TREATMENT OF ULCERATIVE COLITIS BY COLECTOMY AND ILEORECTAL ANASTOMOSIS.** *(E.)* Knobloch, J. (Surg. Clinic, Postgrad. Med. Inst., Prague, Czechoslovakia) and J. Novak. *Amer. J. Proct.* 19(3):218-223, 1968.

2400 **ASSESSMENT OF LIVER AND PANCREAS FUNCTIONS IN ULCERATIVE COLITIS.** *(Pol.)* Kotlarek-Haus, S. (3d Med. Clin., Wroclaw Acad. Med., Poland), M. Dyczkowska and K. Gabryś. *Pol. Tyg. Lek.* 23(23):862-864, 1968.

2401 **INDICATIONS FOR COLECTOMY IN ULCERATIVE COLITIS.** *(Fl.)* Hellemans, N. (Groningen). *T. Gastroent.* 11(1):25-36, 1968.

2402 **EFFECT OF LIPOTROPIC VITAMINS ON FATTY INFILTRATION OF THE LIVER IN NONSPECIFIC ULCERATIVE COLITIS PATIENTS.** *(Rus.)* Vinogradova, M. R. (Gastroenterology Lab., Acad. Med. Sci. USSR, Leningrad). *Klin. Med. (Moskva)* 46(4):92-102, 1968.

2403 **PECULIARITIES OF THE COURSE OF NON-SPECIFIC ULCERATIVE COLITIS.** *(Rus.)* Ginzburg, N. B., G. I. Siulev and M. G. Nebera. *Klin. Med. (Moskva)* 46(4):102-106, 1968.

2404 **THE PROGNOSTIC VALUE OF THE SERUM PROTEINS IN ULCERATIVE COLITIS.** *(E.)* De Dombal, F. T. (Gen. Infirm., Leeds, England). *Brit. J. Surg.* 54(10):857-859, 1967.

2405 **IMMUNOLOGY OF EXPERIMENT ULCERATIVE COLITIS. PRODUCTION, PREVENTION, AND RECOVERY OF THE DISEASE.** *(Fr.)* Zweibaum, A. (Inst. Nat. Health & Med. Res., Paris, France). *Rev. Med.* 9(8):481-487, 1968.

2406 **REACTIVITY *IN VITRO* OF LYMPHOCYTES FROM PATIENTS WITH ULCERATIVE COLITIS.** *(E.)* Hinz, C. F. (U. Connecticut Sch. Med., Hartford), P. Perlmann and S. Hammarstrom. *J. Lab. Clin. Med.* 70:752-759, 1967.

See also abstract no.: 1925

2407 THE EXOCRINE AND ENDOCRINE FUNCTION OF THE PANCREAS FOLLOWING GASTRECTOMY AND RESECTION OF THE PROXIMAL PORTION OF THE STOMACH. *(Rus.)* Kvashnin, Iu. E. (Moscow Sci. Res. Inst. Roentgenol. Radiol., Min. Health RSFSR, USSR). *Khirurgiia (Moskva)* 44(2):47-52, 1968.

Pancreatic function was studied 1 month to 10 yr after gastrectomy (40 cases) or resection of the proximal portion of the stomach (11 cases) in 51 patients (32 men and 19 women, most 45-65 yr old), 46 of whom had been treated for cancer. The volume of pancreatic secretion in response to intraduodenal administration of HCl was usually increased, but there was also an increase in the latent period and (in 15 cases) a decrease in the enzyme content. Although enzyme secretion was essentially normal in 36 patients (including 6 with elevated amylase levels), and although no depression of amylase secretion was observed, lipase secretion was subnormal in 15 cases (13 after gastrectomy and 2 after partial resection), 7 of whom (all gastrectomized) also showed subnormal trypsin secretion. The incidence of abnormal pancreatic function was significantly higher in patients who were studied during the first 3 yr after their operation, and most disorders in exocrine function were normalized by the end of the first year. Glucose tolerance curves revealed abnormal endocrine function in 44 of these patients, including 13 of the 15 discussed above. This concordance, and the fact that combined disturbance of both endocrine and exocrine pancreatic function was 2.5 times as common after total gastrectomy as after partial resection of the stomach, indicates that the pancreatic disorders were probably a result of vagotomy. Partial resection is to be preferred to total gastrectomy whenever this is consistent with the principle of radical operation for malignancy.

2408 DUODENAL FLUID pH IN CYSTIC FIBROSIS. *(E.)* Knauff, R. E. (Temple U. Sch. Med., Philadelphia, Pa.) and J. A. Adams. *Clin. Chem.* 44(5):477-479, 1968.

Contrary to the widespread belief that the duodenal fluid pH is essentially normal in cystic fibrosis, studies in 10 children with cystic fibrosis and 9 controls (2 months - 9 yr old) yielded mean pH values of 5.1 ± 0.7 (range 2.0-7.7) and 6.3 ± 0.2 (range 4.8-7.0), resp.; exclusion of one cystic fibrosis patient with normal tryptic activity and a duodenal pH of 7.7 yielded a mean pH of 4.8 ± 0.7 (range 2.0-6.9). The duodenal fluid samples were collected from fasted subjects by means of a 3-hole Levin tube placed, with fluoroscopic control, in the second segment of the duodenum. Control studies showed that the pH of both normal and cystic fibrosis duodenal fluid increased significantly during storage in the refrigerator (4C) for 48 hr, which may account for the alkaline values often reported in the literature. In one patient studied, with a duodenal fluid pH of 5.0, the gastric juice had a pH of 2.5 and was hypoacid rather than hyperacid.

2409 PHYSIOLOGIC STUDIES ON THE HETEROTOPIC AUTOTRANSPLANTED CANINE PANCREAS. *(E.)* Ashikari, H. (Mt. Sinai Med. Sch., New York City) and D. A. Dreiling. *Amer. J. Gastroent.* 49(3):235-240, 1968.

The endocrine and exocrine function of the pancreas was studied following homotransplantation and heterotopic autotransplantation to the neck in 40 dogs. The procedure used varied with respect to the duodenum, but the accessory lobe was always resected and the accessory duct ligated; revascularization was accomplished by end-to-end anastomosis between the gastroduodenal and distal external jugular veins. Experience in 30 successful cases (survival of 1-18 months) showed that total pancreatic transplantation with sacrifice of the duodenum was the most effective method. Death usually resulted from dehydration or inanition, and 4 dogs showed major venous thrombosis. Autotransplantation of the pancreas had no significant effect on the serum electrolytes, blood amylase, 24-hr volume of pancreatic secretion, or the basal amylase content of the pancreatic juice. The blood sugar remained elevated for 2-3 hr following successful transplantation, after which it returned to normal values regardless of the recovery of exocrine pancreatic function. After transplantation, there was a slight decrease in the amylase response to secretin and pancreozymin and a marked increase (50%) in the volume response to secretin. Both the basal and secretin-stimulated bicarbonate secretion were markedly decreased, to an average of 40% of control values (decrease in concentration from 50-70 to 30-40 mEq/liter and in secretin-stimulated output from 0.6 to 0.36 mEq). This combination of increased flow and decreased bicarbonate response is reminiscent of the findings in chronic pancreatitis in man. Histologically, autotransplantation was followed by immediate pancreatic edema which soon subsided to be followed by varying degrees of atrophy and fibrosis of the exocrine but not the endocrine parenchyma. This development casts doubt on the clinical usefulness of pancreatic transplantation for exocrine secretory replacement.

2410 THE IMMUNOGLOBULINS IN CYSTIC FIBROSIS OF THE PANCREAS. *(It.)* Gravina, E. (Pediat. Clin., U. Padua, Italy). *Acta Paediat. Lat.* 21(1):103-111, 1968.

Electrophoretic studies of the serum proteins in 30 children (1 month - 15 yr of age) with cystic fibrosis and 30 healthy controls of the same age revealed significant differences only for the γ_G-globulins (IgG). As determined by the radial immunodiffusion technique, the mean IgG levels were 841 ± 180 mg% (range 110-2440 mg%) in children with cystic fibrosis and 637 ± 47 mg% (range 330-880 mg%) in controls (significant difference with $p < 0.05$). The IgA and IgM levels were slightly higher in cystic fibrosis, as were the β- and γ-globulins as a whole, but the differences were not significant. The total proteins, albumins and α-globulins were insignificantly lower in children with cystic fibrosis. Even in the case of the IgG levels, only 7 of 30 patients had values markedly above normal, and another 7 of 30 had markedly subnormal values which are ascribed to general marasmus. In healthy children, the IgG levels showed a minimum of 300-600 mg% around the age of 6 months, followed by a gradual rise, while the IgA and IgM levels were low initially and increased gradually throughout childhood.

2411 THE PRINCIPAL ALPHA-1 GLOBULINS IN CYSTIC FIBROSIS OF THE PANCREAS. *(It.)*

Gravina, E. (Pediat. Clin., U. Padua, Italy). *Acta Paediat. Lat.* 21(1):112-118, 1968.

In 30 children (1 month - 15 yr of age) with cystic fibrosis, although the total α_1-globulin levels were slightly (not significantly) lower than those of healthy children of the same age, determinations of the individual α_1-globulins by the radial immunodiffusion technique revealed significantly ($p < 0.01$) higher levels of α_1-acid glycoprotein: 65 ± 13 (range 15-155) mg% compared to 47 ± 9 (range 19-177) mg% in controls. The levels of α_1-antitrypsin and α_1-lipoprotein, although somewhat lower and higher, resp., than in controls, were not significantly altered in the patients with cystic fibrosis.

2412 **SURVIVAL OF PATIENTS WITH SMALL CARCINOMAS OF THE HEAD OF THE PANCREAS. BILIARY-INTESTINAL BYPASS VS. PANCREATODUODENECTOMY.** *(E.)* Monge, J. J. (Duluth Clinic Ltd., Minn.). *Ann. Surg.* 166(1):908-912, 1967.

The study of 23 patients (13 men and 10 women; average age, 67.7) who had undergone palliative biliary bypass for small carcinomas of the head of the pancreas revealed that half the patients were comfortable for 5 months following surgery—the length of palliation varying between 1 and 39 months (average 8 months). The major recurrent distress was pain in 12, jaundice in 4, gastrointestinal hemorrhage in 4 and emesis in 3. All the patients died—half of them within 9 months following surgery; the length of survival ranged from 2 to 42 months, and averaged 1 year. Although most patients with carcinoma of the head of the pancreas are best treated by a conservative surgical procedure, radical pancreatoduodenectomy remains the only potentially curative operation since it produces longer palliation as well as longer survival.

2413 **MICROCIRCULATORY DYNAMICS IN THE NORMAL AND INFLAMED PANCREAS.** *(E.)* Anderson, M. C. (Northwestern U. Med. Sch., Chicago, Ill.) and W. R. Schiller. *Amer. J. Surg.* 115(1):118-127, 1968.

The mechanism by which both enzymes and erythrocytes gain entry to the lymphatic circulation during acute pancreatitis was studied by intraductal injections of India ink in healthy mongrel dogs and in dogs with pancreatitis induced by injection of trypsin solution. The injection study pattern was as follows: 1) retrograde injection of India ink solution into the thoracic duct of normal dog, into the thoracic duct during pancreatitis, into the pancreatic ducts, and into the pancreatic ducts after thoracic duct ligation; 2) retrograde injection of India ink into the peripancreatic lymphatics, the local arterial circulation, and local venous circulation during acute pancreatitis. When India ink was infused into the main pancreatic duct in the normal pancreas, particles were seen to pass between cells of the acinar unit and to accumulate in a well-defined periacinar space adjacent to the basilar region of the unit, which appeared to communicate directly with terminal ramifications of the lymphatic circulation. When the thoracic duct was ligated, much of the ink remained in the periacinar spaces but also a concentration of particulate material was seen in the liver (thus showing some communication with portal circulation). The periacinar spaces became acutely distended in pancreatitis and were seen to communicate with both lymphatic and blood circulation, with congestion and stasis of both. Erythrocytes were then seen to fill periacinar spaces, thus serving as a possible cause of the observed hematochylia.

2414 **CYTOLOGIC DIAGNOSIS OF PANCREATIC CANCER BY DUCTAL ASPIRATION.** *(E.)* Rosen, R. G. (Montefiore Hosp., Bronx, N. Y.), M. Garret and E. Aka. *Ann. Surg.* 167(3):427-432, 1968.

The efficiency and accuracy of cytologic diagnosis of pancreatic cancer based on examination of pancreatic duct aspirat are evaluated. The study was conducted in 23 patients with enlargement of the pancreas head with suspicion of cancer. In 2, the pancreatic duct was not palpable and ductal aspiration was not possible. In 21, fluid was aspirated during laparotomy. Staining of the aspirate and classification of finding were carried out using the Papanicolaou methods. Of 11 patients with pancreatic cancer, the cytologic diagnosis was positive for cancer in 9 but the remaining 2 were false negatives using this method. There were no false positives. There was no morbidity from ductal puncture, and the method is felt to be safe and efficient.

2415 **A RARE TUMOR OF THE HEAD OF THE PANCREAS (HEMOLYMPHANGIOMA WEIGH 1500 KG). [CASE REPORT]** *(Fr.)* Couinaud, C., Jouan, Prot, Chalut, Favre and Schneiter. *Presse Med.* 75(39):1955-1956, 1967.

2416 **FORTSCHRITTE IN DER PANKREASFUNKTIONSDIAGNOSTIK: BEITRAG ZUM PROBL DER DIAGNOSE VON SUBAKUT-CHRONISCHEN PANKREASAFFEKTIONEN UNTER SPEZIELLER BERUCKSICHTIGUNG DER STUHLENZYMMETHODE UND DES PANKREOZYMIN-SECRETINTESTS. (PROGRESS IN PANCREATIC FUNCTION DIAGNOSIS: CONTRIBUTION TO THE PROBLEM OF DIAGNOSING CHRONIC SUBACUT PANCREATIC DISORDERS WITH SPECIAL CONSIDERATI OF THE STOOL ENZYME METHOD AND THE PANCREOZYMIN-SECRETIN TEST).** *(Ger.)* Ammann, R. (Med. U. Polyclin., Zurich, Switzerland). Berlin-Heidelberg, Springer Verlag, 1967. 182 pp.

2417 **PROTECTION OF CANINE PANCREATIC ULTRASTRUCTURE AGAINST RADIATION DAMAGE BY POST-TREATMENT WITH ALLOXAN.** *(E.)* Wellmann, K. F. (Jewish Chron. Dis. Hosp., Brooklyn, N. Y.), B. W. Volk and S. S. Lazarus. *Nature* 216(5110):86-87, 1967

2418 **PATTERNS OF HEMORRHAGE INTO PANCREATIC PSEUDOCYSTS.** *(E.)* Dardik, I. and H. Dardik. *Amer. J. Surg.* 115(6):774-776, 1968.

2419 **DUODENOCOLIC FISTULA DUE TO CARCINOMA OF THE PANCREAS.** *(E.)* Won, K. H. (Dept. Surg. & Pathol., Harrisburg Hospital, Pa.). *Int. Surg.* 49(6):566-570, 1968.

2420 **FAMILY STUDY OF 52 PANCREATIC CANCER CASES INCLUDING 5 ANAPLASTIC CANCERS** *(Fr.)* Conte, M. (St. Antoine Hosp., Paris, France), F. Bodin, L. C. Grunberg and Mme Conte-Marti. *Gaz. Méd.* 74(28):5213-5218, 1967.

2421 ACTION OF A LYOPHILIZED PANCREAS PREPARATION IN SOME DIGESTIVE INSUFFICIENCIES IN INFANTS. *(It.)* Crosato, M. (Pediat. Clinic, U. Turin, Italy) and G. Crua. *Minerva Pediat.* 20(11): 613-614, 1968.

2422 INJURIES OF THE PANCREAS. *(Por.)* De Mello, J. B. (Med. Fac., U. Sao Paulo, Brazil), A. Garrido Jr. and E. Vasconcelos. *Rev. Paul. Med.* 71(2):63-78, 1967.

2423 FUNCTIONAL STATE OF THE PANCREAS AFTER RADICAL GASTRIC SURGERY. *(Rus.)* Kuznetsov, N. N. (Nagatinsk Line Hosp., USSR). *Klin. Med. (Moskva)* 46(4):61-65, 1968.

2424 HISTOPATHOLOGICAL HEPATIC LESIONS IN ACUTE EXPERIMENTAL PANCREATITIS IN DOGS. *(E.)* Tyszkiewicz, S. (Med. Acad., Bialystok, Poland) and E. Bernacki. *Acta Physiol. Pol.* 18(3):403-417, 1967.

2425 BLIND PANCREATIC RESECTION FOR SUSPECTED INSULINOMA: A REVIEW OF THE PROBLEM. *(E.)* Mengoli, L. (Middlesex Hosp., London, England) and L. P. Le Quesne. *Brit. J. Surg.* 54(9):749-756. 1967.

2426 SYSTOLIC MURMUR IN THE UPPER LEFT UMBILICAL REGION FROM A CANCER OF THE BODY OF THE PANCREAS. *(Fr.)* Warter, J. (Central U. Hosp., U. Strasbourg, France) and D. Storck. *Strasbourg Med.* 18(9):810-818, 1967.

2427 INCORPORATION OF TRITIATED AMINO ACIDS BY THE ACINAR CELLS OF THE PANCREAS, OBSERVED BY LIGHT AND ELECTRON MICROSCOPE, BEFORE AND AFTER MITOSIS IN THE YOUNG RAT. *(Fr.)* Sesso, A. (Fac. Med. Sao Paulo, Brazil), P. A. Abrahamsohn, E. Freymueller and V. Valeri. *C. R. Acad. Sci. (Paris)* 266(16)(Ser. D.):1668-1670, 1968.

2428 CASE REPORT OF HEMORRHAGIC NECROSIS OF THE PANCREAS. *(It.)* Dede, G. (U. Cagliari, Sardinia, Italy). *Rass. Med. Sarda* 71(1):37-48, 1968.

2429 CURRENT REPORT ON PANCREAS TRANSPLANTATION. *(Fr.)* Grenier, J. F. (Inst. Nat. Health & Med. Res., Paris, France), M. Gillet, P. Wong, A. Klein and A. G. Weiss. *Strasbourg Med.* 19(2):157-164, 1968.

2430 THE EFFECT OF RADIATION ON ULTRASTRUCTURE AND ENZYMES OF THE CANINE PANCREAS. *(E.)* Volk, B. W. (Jewish Chron. Dis. Hosp., Brooklyn, N. Y.) and K. F. Wellmann. [Pp. 73-93 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2431 THE RESTRAINING ACTION OF WEAK DOSES OF ADRENALIN AND NORADRENALIN ON INSULIN SECRETION OF THE ISOLATED AND PERFUSED RAT PANCREAS. *(Fr.)* Loubatieres, A. (Fac. Med., U. Montpellier, France), M. M. Mariani, J. Chapal and A. Portal. *C. R. Soc. Biol. (Paris)* 161(12):2578-2582, 1967.

2432 SYSTEMATIC STUDY OF CERTAIN PARAMETERS OF PANCREATIC JUICE IN DOG WITH A LONG-TERM EXPERIMENTAL FISTULA. *(Fr.)* Verine, H. (Inst. Nat. Health & Med. Res., Lyon, France), M. Barbier, M. Edjazi, J. P. De Roissard and C. Bacques. *C. R. Soc. Biol. (Paris)* 161(12):2524-2527, 1967.

2433 THE EFFECT OF BUTYL-2-CYANOACRYLATE IN WOUNDS OF THE PANCREAS. *(Ger.)* Hoferichter, J. (Surg. Clinic, U. Erlangen-Nürnberg, W. Germany) and S. Hoferichter. *Beitr. Klin. Chir.* 216(2):170-176, 1968.

2434 DIABETIC COMA AND PANCREATITIS. *(Ger.)* Hayduk, K. (Med. Clinic, U. Tübingen, W. Germany), F. Dürr and P. Schollmeyer. *Deutsch. Med. Wschr.* 93(18):913-916, 1968.

2435 A CASE OF PERICARDIAL EFFUSION IN THE PRESENCE OF PANCREATIC LITHIASIS. *(Fr.)* Levrat, M., B. Moulinier, F. Martin and H. Perrot. *Lyon Med.* (10):793-801, 1968.

2436 TRAUMATIC LESIONS OF THE PANCREAS. *(Sp.)* Gonzalez, A. M. *Galicia Clin.* 40(2):111-129, 1968.

2437 A SIMPLE METHOD FOR DIAGNOSIS OF EXOCRINE PANCREATIC INSUFFICIENCY: DETERMINATION OF MAXIMUM BICARBONATE DEBT BY CONTINUOUS SECRETIN PERFUSION. *(Fr.)* Ribet, A. (Toulouse, France), J. P. Pascal and N. Vaysse. *Acta Gastroent. Belg.* 31(1):11-17, 1968.

2438 BILIARY TRACT AND PANCREATIC DUCTS. *(Sp.)* Dominguez, C. S. *Cir. Cir.* 34(4):426-429, 1968.

2439 CYSTADENOMA AND CYSTADENOCARCINOMA OF THE PANCREAS. *(Heb.)* Teva, Z., J. Horvitz and M. Horvitz. *Harefuah* 73(10):359-361, 1968.

2440 CYTOPLASMIC CHANGES IN PANCREATIC ACINAR CELLS OF THE RAT CAUSED BY 1-AMINOCYCLOPENTANE CARBOXYLIC ACID (ACPC): A LIGHT AND ELECTRON MICROSCOPIC STUDY. *(E.)* Chenard, J. and C. Auger. *Amer. J. Path.* 52(4):825-840, 1968.

2441 IMMUNOLOGIC AND CHEMICAL STUDIES OF CYSTIC FIBROSIS AND NORMAL GLYCOPROTEIN OF TAMM AND HORSFALL. *(E.)* Schwartz, R. H. (Natl. Inst. Arthritis and Metabolic Diseases, Bethesda, Maryland) and J. C. Pallavicini. *J. Lab. Clin. Med.* 70:725-735, 1967.

2442 **APROTININ THERAPY AS PROPHYLAXIS AGAINST POSTOPERATIVE PANCREATITIS IN HUMANS: A CONTROLLED EVALUATION.** *(E.)* Skinner, D. B. (Johns Hopkins U. Sch. Med., Baltimore, Md.), J. G. Corson and G. L. Nardi. *J.A.M.A.* 204(11):945-948, 1968.

In a prospective double-blind study on 99 patients (44 men and 55 women, including 35 with previous pancreatitis, 17 with a history of alcoholism and 39 with jaundice) subjected to a variety of surgical procedures (cholecystectomy, exploration of the common bile duct, transduodenal sphincterotomy, resection of the pancreas or stomach) in the area of the pancreas, the proteinase inhibitor aprotinin (Trasylol; 100,000 U i.v. during the operation and 200,000 U/day for 2 days postoperatively) was found to be of no significant value in the prevention of postoperative pancreatitis. Pancreatitis developed in a total of 16 cases, including 6 (3 receiving aprotinin and 3 receiving placebo) with mild symptoms (serum amylase of 25-78 in 5 of 6), 9 (7 receiving aprotinin and 2 receiving placebo) with moderate symptoms (serum amylase of 63-300), and one case (receiving aprotinin) of severe pancreatitis (serum amylase of 720). Neither the current diagnosis (pancreatitis in 25, cholecystitis only in 11, choledocholithiasis in 32, pancreatic tumor in 6, peptic ulcer in 20, miscellaneous in 5) nor the presence of jaundice or alcoholism had any significant effect on the incidence of postoperative pancreatitis. The rate was higher (29%), however, among patients with a history of pancreatitis, which may also be related to the increased incidence of pancreatitis in the younger patients: average ages of 51 and 61 yr, resp., among those developing or not developing pancreatitis, 52 and 63 yr, resp., among those with or without a history of pancreatitis, and 45 and 56 yr, resp., among those with a history of pancreatitis who developed or did not develop pancreatitis postoperatively. Among 28 patients who were below 50 at the time of surgery, 9 developed pancreatitis, compared to only 7 of 71 patients who were above the age of 50. Postoperative pancreatitis developed in 0 of 11 patients subjected to cholecystectomy alone, 5 of 39 subjected to choledochotomy, 5 of 15 subjected to sphincteroplasty, 3 of 7 with resection of the pancreas, 3 of 21 with resection of the stomach for ulcers, and 0 of 6 subjected to vascular surgery, but this distribution was unaffected by the use of aprotinin.

2443 **A STUDY OF URINARY AMYLASE EXCRETION IN PATIENTS WITH ACUTE PANCRATITIS.** *(E.)* Calkins, W. G. (VA Hosp., Kansas City, Mo.). *Amer. J. Gastroent.* 49(5):415-424, 1968.

The rate of urinary amylase excretion was determined over the course of 78-94 hr in 5 patients (men, 36-48 yr old, all with a history of alcoholism) with acute pancreatitis (serum amylase values of 360-1150 Somogyi units on admission). All 5 patients showed marked fluctuations in the one-hr urinary amylase excretion rates, which could not be correlated with their clinical status. Of the 20 24-hr urinary amylase excretion values determined in these 5 patients, 10 were normal and 10 abnormal, the normal values being observed in the later stages of the disease after treatment. All the abnormal 24-hr values were associated with one or more abnormally high one-hr values, but 3 of the 5 patients had one or more normal one-hr excretion rates during a collection period in which the 24-hr value was abnormally high. Four of the 10 collection periods in which the 24-hr value was normal (one in each of 4 patients) were associated with one or more periods of abnormally high one-hr urinary amylase excretion. These results indicate that a normal 24-hr urinary amylase cannot be used to rule out acute pancreatitis, although it remains true that the urinary amylase is more reliable than the serum amylase. The initial one-hr urinary amylase excretion was abnormal in all 5 cases, and is recommended as a valuable aid in the assessment of acute pancreatitis. The use of fractional urinary amylase determinations every 8-12 hr for several days is recommended to detect fluctuations in the course of acute pancreatitis. Of the 5 patients reported, 2 died in hepatic coma on the 6th-7th day and 3 recovered after treatment with parenteral fluids, transfusions, meperidine, and propantheline or atropine + phenobarbital.

2444 **VASOPRESSIN IN THE TREATMENT OF ACUTE EXPERIMENTAL PANCREATITIS.** *(E.)* Andreadis, P. (Surg. Dept., U. Thessaloniki, Greece), K. Kiriakou and C. Tountas. *Ann. Surg.* 166(1):913-918, 1967.

Pancreatitis was induced in 20 mongrel dogs (8-10 kg) by injection of a mixture of trypsin and bile. Ten dogs were treated with vasopressin (80 U in 500 cc 5% dextrose, i.v. over 6 hr, followed by 20 U i.m. every 4 hr for the next 5 days). In this group, the course of pancreatitis was seen to be benign and survival was clearly longer than in controls. It is felt that vasopressin: 1) decreased the pancreatic blood flow and therefore the secretion of activated enzymes into the systemic circulation (enzyme values in control animals were higher than in treated animals in the first postoperative hours); 2) probably has antishock properties by helping to prevent visceral stagnation of blood and development of hypovolemia; and 3) protects the animals from stasis in the portal system. Data as yet are unavailable to differentiate the principal protective action of vasopressin in the 3 items above.

2445 **CURRENT THOUGHTS ON THE ETIOLOGY OF ALCOHOLIC PANCREATITIS.** *(E.)* Torma, M. J. (U. Alabama Med. Ctr., Birmingham). *Alabama J. Med. Sci.* 5(2):213-218, 1968.

Evidence suggests that hypertriglyceridemia is associated with the onset of pancreatitis, especially with alcohol ingestion. The investigation of the role of hyperlipemia is complicated by interaction of humoral, vascular, and neural factors and of basic protein synthesis. It is felt that a metabolic defect exists at the enzymatic level which becomes overt after alcohol ingestion which could bring about pancreatic stimulation, transient ductal obstruction, and/or neurovascular effects.

2446 **PANCREATITIS II. MANAGEMENT OF PATIENTS WITH ACUTE AND RECURRENT ACUTE PANCREATITIS.** *(E.)* White, T. T. (1115 Columbia St., Seattle, Wash.), J. Murat and A. Morgan. *Northwest Med.* 67(5):470-474, 1968.

Based on a review of 358 patients with acute pancreatitis, primary and secondary treatment are described. In patients with acute pancreatitis, amylase activity is at least 5 times the normal level and all signs of acute abdominal emergency are present. Primary treatment consists of: 1) suppression of pancreatic secretion (by suction aspiration, atropine or pentolinium tartrate administration), 2) treatment for shock, 3) fluid and electrolyte replacement, 4) insulin administration for diabetes, 5) antibiotics administration to avert infection, and 6) control of pain. The frequency of acute pancreatitis occurring in patients with gallstones dictates that routine cholangiograms be carried out. Treatment of recurrent attacks includes diagnostic laparotomy, cholangiogram, papillotomy, and pancreatogram.

2447 **ACUTE PANCREATITIS OCCURRING AFTER OPERATION.** *(E.)* Peterson, L. M. (Peter Bent Brigham Hosp., Boston, Mass.), J. J. Collins Jr. and R. E. Wilson. *Surg. Gynec. Obstet.* 127(1):23-28, 1968.

Of 22 patients with acute postoperative pancreatitis, 8 (36%) died, as compared to a mortality rate of 18% for other types of pancreatitis. One or more previous attacks of pancreatitis appeared to have a protective effect in this series. The difficulty of early diagnosis of postoperative pancreatitis is stressed. Indicative symptoms include hypotension, oliguria, jaundice, or mass in the upper part of the abdomen in the presence of an elevated serum amylase level. Prognosis was poor when serum amylase level fell, notwithstanding continued pancreatitis, progressive jaundice, azotemia, or hypocalcemia. Precipitating factors in 11 patients undergoing first attack included pseudocyst, hemorrhage, abscess, fistula, intestinal necrosis, or disruption of incision. The apparent etiologic factors present in 18 patients were ductal obstruction (7), pancreatic trauma (6), ampullary trauma (2), and vascular injury (3). In management of the attack, meticulous control of volume replacement is stressed, with an aggressive surgical management of complications.

2448 **PROBABLE PANCREATIC ENCEPHALOPATHY TREATED BY TRYPSIN INHIBITORS. [CASE REPORT]** *(Fr.)* Brion, S. (Foch Med. Surg. Ctr., Paris, France), J. Aillet, J. Graveleau and N. Leonardon. *Presse Med.* 76(1):9-12, 1968.

2449 **CHRONIC RECURRENT PANCREATITIS. [CASE REPORT]** *(It.)* Dogliotti, G. C. (Inst. Gen. Clin. Med., U. Turin, Italy). *Minerva Med.* 58(102): 4679-4684, 1967.

2450 **ACUTE PANCREATITIS IN PREGNANCY: REPORT OF 2 CASES WITH MATERNAL SURVIVAL.** *(E.)* Rabkin, R. N. (Samuel Merritt Hosp., Oakland, Calif.). *Obstet. Gynec.* 31(4):508-512, 1968.

2451 **ACUTE EXPERIMENTAL PANCREATITIS IN RATS AND ITS HISTOPATHOLOGICAL DEVELOPMENT IN TIME. PRELIMINARY MEMOIR. ACUTE PANCREATITIS INDUCED BY A COMPLETE PANCREATIC EXTRACT (PANCRENASE) AND BY A SALINE SOLUTION.** *(Fr.)* Hiebel, G. (Cent. U. Hosp., Strasbourg, France), R. Oberling, S. Babin, C. Perez-Day and R. Fontaine. *Arch. Franc. Mal. Appar. Dig.* 57(2):163-175, 1968.

2452 **SPONTANEOUS INTRAPERITONEAL BLEEDING IN CHRONIC RECURRENT PANCREATITIS.** *(Fr.)* Guillemin, G. (Lyon), A. Vachon, H. Viard, F. Tolot, P. Mikaeloff, J. Cuilleret, Y. Sauvage, H. Laurent and D. Montagne. *Arch. Franc. Mal. Appar. Dig.* 57(2):153-162, 1968.

2453 **ACUTE EXPERIMENTAL PANCREATITIS IN RATS AND ITS HISTOPATHOLOGICAL DEVELOPMENT IN TIME. SECOND MEMOIR. ACUTE PANCREATITIS INDUCED BY VARIOUS ENZYMES: TRYPSIN, ALPHACHYMOTRYPSIN, ELASTASE, COLLAGENASE AND LIPASE.** *(Fr.)* Hiebel, G. (Strasbourg, France), F. Oberling, S. Babin, C. Perez-Day and R. Fontaine. *Arch. Franc. Mal. Appar. Dig.* 57(2):177-186, 1968.

2454 **ACUTE EXPERIMENTAL PANCREATITIS IN RATS AND ITS HISTOPATHOLOGICAL DEVELOPMENT IN TIME. THIRD MEMOIR. ACUTE PANCREATITIS CAUSED BY TRYPSIN INHIBITORS ZYMOFREN AND INPROL.** *(Fr.)* Hiebel, G. (Strasbourg, France), F. Oberling, S. Babin, G. Lang, C. Perez-Day and R. Fontaine. *Arch. Franc. Mal. Appar. Dig.* 57(2):187-196, 1968.

2455 **THE TREATMENT OF ACUTE PANCREATITIS WITH TRASYLOL.** *(Rus.)* Ryneiskii, S. V. (N. I. Pirogov 2d Moscow Med. Inst., USSR), P. I. Ostrin, M. I. Filimonov and B. F. Khovanskii. *Khir.* 44(3):119, 1968.

2456 **LACTASE ACTIVITY IN THE SMALL INTESTINE IN EXPERIMENTAL PANCREATITIS.** *(Ger.)* Diwok, K. (Med. U., Rostock, Germany) and H. J. Huetter. *Acta Biol. Med. German.* 20(1):91-95, 1968.

2457 **SURGICAL MANAGEMENT OF ACUTE PANCREATITIS.** *(E.)* Kuker, L. H. (Carroll, Iowa). *J. Abdom. Surg.* 10(6):165-167, 1968.

2458 **MORPHOLOGIC LESIONS OF DOGS' THYROID IN THE COURSE OF EXPERIMENTAL ACUTE PANCREATITIS.** *(E.)* Tyszkiewicz, S. and E. Bernacki. *Acta Physiol. Pol.* 18(4):658-670, 1967.

2459 **FAMILIAL PANCREATITIS.** *(E.)* Logan, A. Jr. (Sacred Heart Found. Med. Res., Spokane, Wash.), C. P. Schlicke and G. B. Manning. *Amer. J. Surg.* 115:112-117, 1968.

2460 **TREATMENT OF PANCREATITIS AND CHOLECYSTOPANCREATITIS WITH TRASYLOL.** *(Rus.)* Mavrodi, V. M. (Kuban' Med. Inst., USSR). *Vestn. Khir. Grekov* 100(5):41-43, 1968.

2461 **CONSERVATIVE TREATMENT OF CHRONIC RELAPSING PANCREATITIS.** *(Rus.)* Porembskii, O. B. (S. M. Kirov Mil. Med. Inst., Leningrad, USSR), A. D. Slobozhankin and T. O. Orlova. *Vestn. Khir. Grekov* 100(5):43-47, 1968.

2462 EXPERIMENTELLE PANKREATITIS: PROTEOLYTISCHE, LIPOLYTISCHE UND BILIARE FORM (EXPERIMENTAL PANCREATITIS: PROTEOLYTIC, LIPOLYTIC, AND BILIARY FORMS) [v.19 OF ZWANGLOSE ABHANDLUNGEN AUS DEM GEBIET DER NORMALEN UND PATHOLOGISCHEN ANATOMIE [INFORMAL ESSAYS IN THE FIELD OF NORMAL AND PATHOLOGICAL ANATOMY)]. *(Ger.)* Wanke, M. Stuttgart, Georg Thieme Verlag, 1968. 71 pp.

2463 LYMPHOGRAPHIC FINDINGS IN CHRONIC PANCREATITIS. *(Ger.)* Sarles, J. C. (Inst. Nat. Health & Med. Res., Marseille, France). *Radiologe* 8(5):167-169, 1968.

2464 ANEURYSM OF THE SPLENIC ARTERY. SECONDARY THROMBOSIS TO A FISSURE WITH A PANCREATIC REACTION. *(Fr.)* Vieville, C. (Inst. Nat. Health & Med. Res., Pavillon, France), P. Revelin, R. Van Gestel, A. Marques, M. George and J. Descotes. *Lyon Chir.* 64(2):225-234, 1968.

2465 THE INTERDEPENDENCE OF ACUTE PANCREATITIS AND DIABETES MELLITUS. *(Rus.)* Akzhigitov, G. N. (I. M. Sechenov 1st Moscow Med. Inst., USSR) and T. A. Strygina. *Klin. Med. (Moskva)* 46(5):70-77, 1968.

2466 TRASYLOL TREATMENT OF ACUTE PANCREATITIS: A DOUBLE BLIND STUDY. *(Sw.)* Storck, G. (Sahlgrenska Hosp., Gothenburg, Sweden). *Nord. Med.* 79(20):651-653, 1968.

2467 SOME PROBLEMS OF BILIARY PANCREATITIS. *(Bul.)* Lozanov, L. *Khirurgiia (Sofia)* 21(1):9-12, 1968.

2468 ACUTE ABDOMINAL HEMORRHAGE REVEALING A PSEUDOCYST IN CHRONIC GALLSTONE PANCREATITIS: NOSOLOGICAL PROBLEMS, LEFT PANCREATECTOMY, AND TREATMENT. *(Fr.)* Joyeux, R., R. Colin and H. LaPeyrie. *Montpellier Med.* 13(6):765-776, 1967.

2469 THE PROBLEM OF ALLERGIC PANCREATITIS. *(Rus.)* Kochnev, O. S. (Kazan' Inst. Postgrad. Med. Studies, USSR). *Klin. Med. (Moskva)* 46(5):49-52, 1968.

LIVER AND BILIARY TRACT

GENERAL

2470 **ACUTE EFFECTS OF ALCOHOL ON THE LIVER WITH SPECIAL REFERENCE TO THE ZIEVE SYNDROME.** *(E.)* Myerson, R. M. (VA Hosp., Philadelphia, Pa.). *Amer. J. Gastroent.* 49(4):304-308, 1968.

Among 33 young men with Zieve's syndrome and resultant hepatomegaly, the principal presenting complaints were jaundice (in 23 cases), abdominal pain or swelling (4 cases each), fever (26 cases), ascites (9 cases) and edema (7 cases); only one patient had splenomegaly and two complained of anorexia or nervousness. Liver function tests revealed a total serum bilirubin of 6.8 mg%, an alkaline phosphatase of 12.6 and a serum glutamic-oxaloacetic transaminase of 80. Among 25 liver biopsies, 22 showed fatty infiltration with or without fibrosis and 3 showed only fibrosis. Acute hemolytic anemia was diagnosed by a hemoglobin of 10.2 and a hematocrit of 33 vol %, a normoblastic hyperactive bone marrow, a reticulocytosis of 8%, a negative Coombe's test, and normal values for osmotic fragility, glucose-6-phosphate dehydrogenase, red blood cell cholinesterase, serum vitamin B_{12} and serum folic acid. This diagnosis was entertained in spite of normal chromium survival, a phenomenon seen occasionally when acute hemolysis is of very brief duration.

2471 **FUNCTIONAL AND HISTOLOGICAL DATA ON THE LIVER IN DIABETES.** *(It.)* Gambigliani-Zoccoli, A. (Maggiore Hosp., Novara, Italy) and G. Comoli. *G. Clin. Med.* 49(1):18-55, 1968.

The functional and histological signs of liver damage encountered among 461 diabetics (mostly women above 40 yr of age, with a history of diabetes of 1-20 yr) examined during the past 10 yr, 73 of whom submitted to liver biopsy, are reviewed and correlated with data as to sex, age, duration of diabetes, alcoholism, and the incidence of biliary and hepatic disease. Hypoalbuminemia was found in 19-37% and hypergammaglobulinemia in 0-11%, with a tendency for the incidence to increase with age but not with the duration of diabetes. Positive flocculation tests, urobilinogenuria and hypoprothrombinemia showed a similar distribution. Analysis of these and other laboratory findings revealed 50 cases of possible hepatitis and 31 cases (16 men and 15 women, 15 and 4 of whom, resp., were alcoholics) with a definite diagnosis of chronic cirrhotogenic hepatitis or cirrhosis. Among 29 cases in which the sequence could be determined, the hepatic disease preceded the diabetes in 22 cases and followed it in only 7. Among 40 patients subjected to sulfobromophthalein retention studies, including 12 with hepatitis or cirrhosis, 17 showed abnormal values. Among 36 patients subjected to serum enzyme determinations, including 9 with hepatitis or cirrhosis, approximately 25% showed pathological values. The 73 liver biopsies included 3 with essentially normal findings, 4 with concurrent hepatic diseases such as cancer, and 3 patients with incomplete liver function studies, so that the functional and histological data could be compared in only 63 cases, including 16 with chronic hepatitis or cirrhosis, 21 with degenerative hepatopathy, and 26 with hepatic microcicatrization (mesenchymal reactivity). There was no correlation between the duration of diabetes and the histological findings in the liver. Liver function tests were abnormal in 75-81% of the 16 patients with chronic hepatitis and cirrhosis, but in only 0-14% of the other two groups. It is concluded that chronic hepatitis and cirrhosis may predispose to diabetes in some cases, while in others, diabetic karyopathy may progress through steatosis to a stage of cytolytic necrotic degeneration with accumulation of glycogen, followed eventually by a phase of mesenchymal reactivity and cicatricization which leads to chronic cirrhotogenic hepatopathy.

2472 **IMMUNOGLOBULINS IN CHRONIC LIVER DISEASE.** *(E.)* Feizi, T. (Roy. Free Hosp., London, England). *Gut* 9(2):193-198, 1968.

Serum immunoglobulin levels were estimated by the immunodiffusion method of Fahey & McKelvey in 116 patients with chronic liver disease (44 with chronic active hepatitis, 19 with cryptogenic cirrhosis, 16 with primary biliary cirrhosis, 14 with alcoholic cirrhosis, 14 with chronic cholestasis due to large bile duct obstruction, 6 with Wilson's disease, and 3 with hemochromatosis) and in 60 healthy controls. Markedly increased levels of IgG, IgA and IgM were seen in the patients in almost all diagnostic groups, compared to mean control values of 1700 (range 1000-2700), 334 (range 57-780) and 75 (range 25-180) mg%, resp. The distribution of IgD levels was essentially the same in patients and controls, although high levels were seen in 2 cases of chronic active hepatitis, 2 cases of cryptogenic cirrhosis, and 2 cases of Wilson's disease. Serum IgG levels were elevated most commonly in active chronic hepatitis (64%) and cryptogenic cirrhosis (63%), compared to 20-46% of the cases in the 3 other principal diagnostic groups. IgA levels were elevated in 46% of patients with alcoholic cirrhosis, but also in 15-36% of the other groups. Very high incidences of elevated IgM levels were seen in primary biliary cirrhosis (81%) and alcoholic cirrhosis (70%), compared to 21-56% of the patients in the other groups. However, the IgM levels in primary biliary cirrhosis could not be correlated with the duration of illness, and these levels were less reliable than the mitochondrial antibody test in differentiating between primary biliary cirrhosis and chronic large bile duct obstruction. There was a striking similarity in the incidence of elevated immunoglobulin levels in chronic active hepatitis and cryptogenic cirrhosis, suggesting that the latter may be the late stage of a subclinical chronic active hepatitis. No single immunoglobulin pattern was the diagnostic of any of the 7 chronic hepatic diseases studied.

2473 **A CONTROLLED TRIAL OF COLON BYPASS IN CHRONIC HEPATIC ENCEPHALOPATHY.** *(E.)* Resnick, R. H. (Boston Inter-Hosp. Liver Group, Lemuel Shattuck Hosp., Boston, Mass.), A. Ishihara, T. C. Chalmers and E. M. Schimmel. *Gastroenterology* 54(6):1057-1069, 1968.

The efficacy, morbidity and mortality of ileosigmoidostomy with colonic exclusion were evaluated in a prospective, controlled trial on 92 cirrhotic patients with neuropsychiatric syndromes due to portal-systemic shunting seen between 1962 and 1967. Preliminary observation for one month or more resulted in the rejection of 36 patients as inoperable because of hepatic failure (27 cases), arteriosclerosis (7 cases) or infection (2 cases); at the same time, 8 patients recovered and 8 patients refused to consider surgery, leaving a group of 40 selected patients (73% male, mean age 53.3 yr) who were potentially operable and were followed for 4-54 months thereafter. These 40 patients were divided randomly into a medically-treated group of 19 and a surgical group of 21, 2 of whom later refused surgery; 18 of the 19 bypass operations were carried out within 3 weeks after selection, one being delayed for 5 months. Three patients in the medical group deteriorated progressively and were operated on several months after selection. At selection, encephalopathy was mild in 0 and 3, moderate in 12 and 11, and severe in 6 and 5 of the surgical and medical groups, resp. The only significant differences between the groups were a higher frequency of prior ascites and suspected esophageal varices, a longer period of encephalopathy and a greater duration of hospitalization before selection in the surgical group, probably indicating a greater degree of portal hypertension. Only 20% of the rejected group survived 12 months, compared to 58% of the selected group. However, there was no significant difference in mortality between the medical and surgical groups (except for the postoperative mortality of 26% in the surgical group, which was balanced out by early mortality in the medical group during the first 6 months); 9 of 19 surgical patients and 10 of 19 medical patients survived a total of 317 and 254 months, resp. (median of 11 months for both groups). Hepatorenal complications accounted for 7 of 10 surgical and 6 of 9 medical deaths. Six months after selection, 8 of 12 living surgical patients and 6 of 13 living medical patients showed improvement in mental status; neomycin treatment was necessary in 1 surgical patient (2 g/day) and 11 medical patients (mean 2.6 g/day). The average daily protein intake was 76 and 61 g, resp., representing increases of 29 g and 10 g, resp., since selection. At last follow-up (11-38 months, median 24 months, after selection for surgical patients and 7-53 months, median 19 months, after selection for medical patients), 3 surgical survivors and 4 medical survivors still showed abnormal mental function, but all 9 surgical patients and only 5 of 9 medical patients had improved as compared to the status at selection. Construction of a 5-pointed star, for example, was accomplished successfully by 6 of 7 surgical patients and only 1 of 9 medical patients. The mean daily protein intake was 67 and 48 g, resp., representing a mean gain of 21 g/day for the surgical group and a decrease of 7 g/day for the medical group. All but 2 surgical survivors had stopped antibiotic therapy, while 6 of 9 medical survivors continued to require oral antibiotics (2 of 6 at increased dosage). The electroencephalogram had improved in 4 surgical and 6 medical patients, and liver function had improved in both groups. Six patients in each group required rehospitalization for treatment of complications of cirrhosis; among 16 admissions for surgical patients and 12 for medical patients, 5 and 10, resp., were for recurrent encephalopathy. Continued alcoholism was reported by 4 surgical and 5 medical patients, 1 and 3 of whom, resp., survived. Productive employment was resumed by 3 surgical and 4 medical patients. Repeated hemorrhage from stomal varices occurred in 3 surgical patients, all of whom had esophageal varices and none of whom had had prior portal decompression. Multiple ligations were required in each case. Among the medical patients, 2 developed moderate deafness due to prolonged oral neomycin. The need for more study of the advantages and hazards of colonic bypass in chronic hepatic encephalopathy is emphasized.

2474 PLASMA ZINC CONCENTRATION IN LIVER DISEASES: COMPARISON WITH NORMAL CONTROLS AND CERTAIN OTHER CHRONIC DISEASES. *(E.)* Halsted, J. A. (VA Hosp., Washington, D. C.), B. Hackley, C. Rudzki and J. C. Smith, Jr. *Gastroenterology* 54(6):1098-1105, 1968.

The plasma zinc concentration was determined by atomic absorption spectrophotometry in 54 patients with various types of liver disease (19 with alcoholic cirrhosis, 7 with postnecrotic cirrhosis and 28 with other types of liver disease not associated with alcohol–hepatitis, Wilson's disease, hepatoma, metastatic carcinoma, pancreatic cancer with obstructive jaundice, drug toxicity, and choledocholithiasis cholangitis), 20 patients with chronic debilitating disease but normal liver function, and 51 healthy controls (26-62 yr old). Age and sex had no significant effect on plasma zinc levels. Patients with liver disease as a group showed significantly lower plasma Zn levels (63 ± 14 μg%, range 42-89, in alcoholic cirrhosis and 70 ± 17 μg%, range 38-103, in other hepatic diseases compared to 96 ± 13 μg% in healthy controls), but there were no significant differences between the various types of liver disease. Among the group with chronic nonhepatic disease, the mean plasma Zn level was 82 ± 18 μg%, range 45-116, which was not significantly different from control values; 16 of 20 were in the range of 70-116 with a mean of 89 ± 12 μg%. The mechanism for the decrease in plasma Zn in patients with hepatic disease remains unclear.

2475 LIVER PRESERVATION: UNPERFUSED COLD STORAGE AND CONTINUOUS COLD PERFUSION. *(E.)* Mieny, C. J. (U. Colorado Med. Sch., Denver) and B. Eiseman. *Surgery* 63(6):923-928, 1968.

As measured by oxygen consumption, sulfobromophthalein clearance, ammonia clearance, ATP regeneration and bile production, the biochemical function of excised pig livers was found to be preserved for 15 hr by either quick cooling to 10-15C with dilute, cold, oxygenated blood, followed by unperfused refrigeration at 6C, or by continuous perfusion with dilute oxygenated blood at 10-15C. However, the latter techniqu preserved *in vitro* liver function for 24 hr or more, by which time the unperfused refrigerated liver had begun to deteriorate. Bile production and ATP regeneration generally failed first, while ammonia and sulfobromophthalein clearance remained relatively stable and the oxygen consumption was decreased only from 1.9 to 1.1 ml/100 g after 48 hr of cold unperfused storage. Continuous cold perfusion through the hepatic artery and portal vein is concluded to be the preferred technique for hepatic homograft preservation.

2476 EXPERIMENTAL STUDY ON HEMODYNAMICS OF HEPATIC ARTERIAL AND PORTAL VENOUS FLOW. *(E.)* Shafey, O. A. (UCLA Sch. Med., Los Angeles, Calif.) and M. A. Hassab. *Surgery* 63(6):962-965, 1968.

Portal venous flow as measured with the square-wave electromagnetic flowmeter in 20 adult mongrel dogs averaged 21.4 cc/kg/min while the hepatic artery flow averaged 11.3 cc/kg/min, yielding a total blood supply to the liver of 32.7 cc/kg/min. Splenectomy and gastroesophageal decongestion decreased the portal venous flow from 429 to 329 cc/min and the portal pressure from 10.6 to 8.0 cm H_2O. This reduction persisted in 2 dogs in which measurements were made again 2 yr later. The reduction in portal venous flow was accompanied by an increase (average 23%) in hepatic artery flow in 11 of 20 dogs, no change in 7 of 20, and a decrease in 2 of 20. Portal vein occlusion for 15-20 min in 10 other dogs led to a sharp drop in both hepatic artery flow and systemic blood pressure, resulting in profound shock due to splanchnic pooling and the effects of anoxia on the liver and intestine. Hepatic artery occlusion had inconsistent effects. It appears that the portal venous flow in the normal dog is usually about twice the hepatic artery flow, but that this relationship is not consistently maintained.

2477 INDUCTION OF TRYPTOPHANE PYRROLASE AND TYROSINE-α-KETOGLUTARATE-TRANSAMINASE IN REGENERATING LIVER OF HYPOPHYSECTOMIZED RATS. *(E.)* Drews, J. (Dept. Med., U. Heidelberg, Germany). *Proc. Soc. Exp. Biol. Med.* 126(3): 671-674, 1967.

In the regenerating livers of male, hypophysectomized, Wistar rats hepatectomized 6-48 hr before the beginning of the experiment, cortisol phosphate (5 mg i.p. 6 hr before sacrifice) produced a marked increase in tyrosine transaminase and only a moderate increase in tryptophane pyrrolase. The base-line activity of tryptophane pyrrolase was somewhat lower 24-hr after hepatectomy (13.7 μmoles kynurenine/hr/g) than in normal liver (21.0) or 6-hr regenerating liver (29.2), and the response to cortisol was markedly depressed (53.7 μmoles kynurenine/hr/g in 24-hr regenerating liver following cortisol, compared to 110 in normal liver). There was some recovery of both the base-line value and the cortisol response 48 hr after hepatectomy. In contrast, the base-line tyrosine transaminase activity was relatively stable after hepatectomy (409-541 μmoles p-hydroxyphenylpyruvate/hr/g compared to 440 in normal liver) and the response to cortisol was markedly enhanced (2829-2292 μmoles p-hydroxyphenylpyruvate/hr/g 6-48 hr after hepatectomy and cortisol, compared to 1311 after cortisol in normal liver). Mitotic activity in the regenerating liver was delayed by about 24 hr in hypophysectomized animals. However, administration of bovine growth hormone (2.0 mg/kg/day s.c. for 5 days before the experiment and continued during it) eliminated this delay in mitotic activity without any effect on the time course of the changes in enzyme induction. It is concluded that neither the changes in base-line enzyme levels nor the response to cortisol are affected by the presence of cell division.

2478 BILIO-BRONCHIAL FISTULAE AS A SERIOUS COMPLICATION OF HYDATID CYSTS OF THE LIVER. *(Fr.)* Guedj, P. (U. Hosp. Ctr., Constantine, Algeria), F. Morvan, A. Solassol and Y. Guidoum. *Lyon Chir.* 64(2):161-183, 1968.

Among 600 cases operated on for echinococcal cysts of the liver in a 6-yr period, 15 had bilio-bronchial or, more properly, bilio-cysto-pneumobronchial fistulae. The anatomy, pathophysiology, diagnosis, prognosis and surgical treatment of such fistulae, which are described as one of 3 possible end results of hydatid cysts on the top or posterior surface of the liver, are discussed on the basis of these 15 cases, which are presented in detail, and a review of the literature (52 refs.). The process of fistulization is generally begun by a calcified cyst which ascends from the top of the liver towards the thorax, injuring the diaphragm, ulcerating the middle or lower lobe of the lung, and eventually opening into the bronchial system. The volume of vomitus and expectoration may reach 2 liters per day, producing a rapid deterioration in the patient's general condition and soon leading to cachexia. Infection of the hepatic cyst, which remains open to the biliary tract, produces a more and more severe inflammatory reaction in the right lung, leading to the formation of a hydatid cavity into which one or more bronchi open. With regard to the surgical treatment, a 2-stage operation is strongly recommended. After thorough medical preparation, the first operation should be carried out on the liver or the hepato-bronchial shunt. A cure can generally be produced by disconnection of the bronchopulmonary system to short-circuit the flow of bile into the bronchi, accompanied by simple drainage or a tunneling procedure. The postoperative course must be controlled, however, by means of regular bronchography (every 2 months), and lower or middle lobectomy, or even bilobectomy, should be performed at a second operation whenever necessary. Among the 15 cases treated according to these principles, there were 2 deaths.

2479 ROLE OF LIVER FUNCTION TESTS AND ELECTROPHORETIC PATTERN OF SERUM PROTEINS IN DIAGNOSIS AND PROGNOSIS OF AMOEBIC LIVER ABSCESS. *(E.)* Kamat, G. R. (Mahatma Gandhi Mem. Hosp., Bombay, India), B. S. Johri, V.P. Pathak and P. G. Tikekar. *J. Trop. Med. Hyg.* 71(5):111-117, 1968.

Among 21 patients with amebic liver abscess, diagnosed clinically and by liver biopsy and treated successfully with emetine HCl (60 mg/day i.m. for 10 days) and chloroquine sulfate (1 g/day p.o. for 2 days + 0.5 g/day for 19 days), the mean results of all the liver function tests performed on admission were significantly abnormal, and all tests showed a significant degree of normalization after the end of treatment. The most sensitive test was sulfobromophthalein retention, which was above normal in 14/15 patients before treatment and in only 7/15 after treatment. Thymol turbidity and alkaline phosphatase were abnormal in 10 and 13 of 19 patients before treatment, resp., and in 3 and 8 after treatment. Cephalin flocculation and serum bilirubin were the least sensitive, being abnormal in 8/19 and 6/21, resp., before treatment and in 4/19 and 2/21 after treatment. Serum electrophoresis at the time of admission showed significant hypoalbuminemia (2.21 g compared to 4.47 in normals) and hyperglobulinemia (4.42 g compared to 2.39) involving all fractions. However, there was no significant change in the serum proteins after treatment. The high percentage of abnormality in globulin precipitation tests, together with the abnormal electrophoretic pattern of the serum proteins, suggests hepatocellular dysfunction.

2480 DEARTERIALIZATION OF THE LIVER IN MALIGNANT METASTATIC DISEASE. *(E.)*

Loughridge, B. P. (Dept. Surg., U. Goteborg, Sweden), O. Almersjo, S. Bengmark and L. O. Hafstrom. *J. Okla. Med. Ass.* 61(5):207-211, 1968.

In a clinical study of hepatic dearterialization in order to produce tumor necrosis without extensive liver damage, 7 patients (4 men, 3 women) with unresectable hepatic malignancy underwent laparotomy for division of the common hepatic artery distal to the gastroduodenal artery. Collateral arterial supply was interrupted by transection of the falciform ligament, triangular ligament, the omentum, and the peritoneal attachment of the right lobe, along with freeing the liver from the diaphragm. The observed alterations in liver function resembled those reported for massive liver resection and appeared to be transitory, generally returning to normal levels in about 2 weeks. No operative or immediate postoperative deaths occurred, indicating that the liver can be maintained on portal venous flow until collateral arterial flow is re-established, during which time extensive tumor necrosis occurs. Graphs are included which show the variations over the 2 postoperative weeks of: serum bilirubin, serum albumin, sodium, potassium, GOT, GPT, LDH, ornithine carbamoyl transferase, glutamyl transpeptidase, alkaline phosphatase, phospholipids, cholesterol, FFA, triglycerides, total protein, albumin, α_1-globulin, α_2-globulin, β-globulin, γ-globulin, fibrinogen, prothrombin-proconvertin, plasminogen, proaccelerin, and anti-hemophilic factor.

2481 GRANULOMATOUS HEPATITIS ACCOMPANYING A SELF-LIMITED FEBRILE DISEASE.

(E.) Eliakim, M. (Hadassah Med. Sch., Jerusalem, Israel), S. Eisenberg, I. S. Levij and T. G. Sacks. *Lancet* 1(7556):1348-1352, 1968.

A self-limited febrile disease resembling infectious mononucleosis is described in 5 patients (2 men, 3 women, 16-42 yr), with fever (for 17-28 days), cough, slight enlargement of spleen, and peripheral lymphocytosis. Gross lymphadenopathy was absent, as were abnormal lymphocytes, and the Paul-Bunnell test was negative. Hepatocellular function tests were slightly impaired but jaundice was absent. Liver biopsies in 3 cases revealed lesions resembling granulomas. The lesions were multiple and localized intralobularly or in portal spaces. The cellular infiltrate consisted of round, elongated, or slightly irregular lymphocytes, plasma cells, and small numbers of histiocytes. Neutrophil granulocytes were occasionally found. The inflammatory cells extended for a short distance between the hepatocyte trabeculae. No caseation, giant cells, bacteria, fungi, or parasites were found. The hepatocytes seemed normal in the non-affected areas. A moderate number of mononuclear cells were present in the sinusoids. Antibiotics did not affect the course of the disease and recovery ensued within 3-4 weeks. Subsequent biopsies were normal.

2482 FACTORS INFLUENCING SURVIVAL IN PATIENTS WITH UNTREATED HEPATIC METASTASES.

(E.) Jaffe, B. M. (Washington U. Sch. Med., St. Louis, Mo.), W. L. Donegan, F. Watson and J. S. Spratt Jr. *Surg. Gynec. Obstet.* 127(1):1-11, 1968.

Records of 390 patients (age 17-97 yr, mean 64 yr, 240 men, 150 women, 22 Negro, 368 Caucasian), hospitalized between 1940 and 1966, with untreated metastases to the liver from a variety of cancers were reviewed. Hepatic metastases were diagnosed but therapy had not been directed to the involved liver. The 1-yr survival rate was 7% and the overall median survival time was 75 days. Intrinsic factors included primary tumor site, histologic tumor type, and degree of differentiation. Although concurrent pulmonary, peritoneal, and nodal involvement did not significantly influence the prognosis, hepatic metastases exerted an overriding influence on the course of the patient. Survival varied inversely with the gross extent of hepatic metastases and laboratory evidence of liver impairment. In patients with a comparable degree of hepatic metastases, palliative resection or diversion of primary colonic and gastric lesions did not influence the length of survival. The overall operative mortality rate was 15% whereas hospital mortality rate was 4% after needle biopsy. Hepatic failure was the possible cause of 17 of the 53 hospital deaths which were unexplained. Data include, in part, distribution of primary lesions, survival in days after diagnosis of hepatic metastases, liver function *vs.* extent of hepatic metastases, and survival according to treatment of primary growth.

2483 INTESTINAL ABSORPTION AND NITROGEN BALANCE FOLLOWING PORTACAVAL SHUNT.

(E.) Fisher, B. (U. Pittsburgh Sch. Med., Pa.), S. Lee, E. J. Fedor and M. Levine. *Ann. Surg.* 167(1):41-46, 1968.

The role of intestinal absorption and nitrogen balance in weight loss following portacaval shunt was studied in: 1) mongrel dogs with end-to-end portacaval shunt, evaluating protein absorption by scintillation count after ingestion of radioactive iodinated serum albumin (RISA), and evaluating fat absorption by ^{131}I-labeled triolein ingestion; 2) in pair-fed Holtzman rats with portacaval shunts, evaluating the nitrogen balance by the Kjeldahl method on urine and feces; and 3) in cirrhotic patients before and after portacaval shunt, evaluating protein and fat absorption with similarly labeled RISA and ^{131}I-triolein. In the dog, absorption of fat and protein was not altered by the shunt. Pair-feeding and nitrogen balance studies in the rat with and without shunt indicated that the weight difference observed in these animals (rats without shunt gained weight) did not result from divergent food consumption or nitrogen retention. The defect in fat and protein absorption seen in cirrhotic humans was, aside from a slight reduction in fecal fat, neither improved nor impaired by portacaval shunts.

2484 A CLINICAL INVESTIGATION OF THE PORTACAVAL SHUNT. II. SURVIVAL ANALYSIS OF THE PROPHYLACTIC OPERATION.

(E.) Jackson, F. C. (VA Hosp., Pittsburgh, Pa.), E. B. Perrin, A. G. Smith, A. E. Dagradi and H. M. Nadal. *Amer. J. Surg.* 115(1):22-42, 1968.

A group of 112 patients with established cirrhosis and nonhemorrhaging esophageal varices were randomly selected and divided for medical or shunt therapy in a prospective controlled study in progress since Jan. 1, 1962, to determine if a portacaval shunt will prevent hemorrhage from esophageal varices and improve the survival. The average follow-up is presently 42 months. Additional objectives are to identify and relate conditions affecting survival (age, duration of clinical signs and symptoms of liver disease, prior treatment, liver failure, associated diseases, clinical, laboratory, pathological observations, peptic ulcer, portal venous pressure, first hemorrhage from varices, postoperative encephalopathy, continued alcoholism, and causes of death). The following conclusions are drawn at this time: 1) initial hemorrhage may be anticipated in 1/5 of patients followed over a 42-month period; 2) esophageal hemorrhage will account for 1/4 of all deaths in these patients and hemorrhage from other sources will account for another 1/4; 3) operative mortality (13.5%) is not a primary factor in survival after a prophylactic shunt; 4) a functioning shunt may considerably reduce death from hemorrhage provided the patient survives the operation and the possible serious complications; 5) after 1 yr of postoperative survival, the most serious threat is liver failure and ulcer disease; 6) an operation in the presence of established liver disease is still incompatible with lengthened survival; 7) the value of prophylactic shunt cannot be adequately assessed until the study includes randomized patients with esophageal varices with sufficient hepatic function reserve to survive 2 years postoperatively; and 8) the portacaval shunt is not recommended for the nonhemorrhaging patient with established cirrhosis with recent ascites, jaundice, or encephalopathy.

2485 **PYOGENIC LIVER ABSCESS: CHANGING PATTERNS IN APPROACH.** *(E.)* Joseph, W. L. (UCLA Sch. Med., Los Angeles, Calif.), A. M. Kahn and W. P. Longmire. *Amer. J. Surg.* 115(1):63-68, 1968.

Sixty-one pyogenic liver abscess cases are reviewed and analyzed according to etiology, symptoms, diagnosis, pathology, and treatment. The patients, 26 males and 35 females, ranged in age from 3 to 72 years. Diagnosis was confirmed by needle aspiration, surgical exploration, or autopsy. Intraperitoneal infection and generalized septicemia were the sources of infection in over 50% of the cases, 15% of the cases were secondary to biliary obstruction, 18% secondary to metastatic carcinoma, and 15% classified as cryptogenic. Twenty-five cases were secondary to streptococcus or staphylococcus, associated with bacterial endocarditis or renal infection; 14 cases were secondary to gram-negative organisms. The duration of illness prior to hospitalization varied from 6 days to 5½ months. The prominent complaints were fever, chills, sweating, malaise, anorexia, and weight loss; jaundice is not common but does occur frequently with multiple abscesses, especially in cholangitis. Laboratory studies and radiography are useful in diagnosis and abscess localization, resp. Treatment consists of antibacterial therapy against the site of infection combined with surgical drainage of the abscess. At operation, the drainage material should be cultured both aerobically and anaerobically to identify the pathogen, so that appropriate antibiotic sensitivity studies can be carried out. The transabdominal approach to drainage is preferred. Understanding the principles involved in single and multiple abscess drainage allows for more prompt and vigorous treatment.

2486 **THE TREATMENT OF HEPATIC COMA BY EXCHANGE TRANSFUSION.** *(E.)* Eisenberg, J. (U. Munich, Germany), K. R. Koczorek, U. Schulz, A. Christoforis and D. Schmidt. *German Med. Monthly* 13(4): 175-180, 1968.

The prognosis of hepatic coma is influenced by pre-existing brain damage, associated disorders, and renal function. A metabolic cause is suggested for hepatic encephalopathy since the disturbances are of a transient and reversible nature and there is widespread central nervous system involvement. Diagnosis of hepatic coma is based primarily on biochemical evidence. Deaths are usually attributed to brain damage caused by disturbed liver glucose utilization with resultant oxygen consumption-glucose uptake dissociation and oxidation of endogenous substrate components of the brain; hyponatremia, hypokalemia, hypoglycemia, ammonia intoxication, and the toxic effects of numerous nitrogenous substances together with serotonin deficiency and a rise in unconjugated bilirubin also contribute to brain damage. Survival lies in bridging the gap between acute liver-cell necrosis and the restoration of liver function. The most satisfactory therapeutic measure is exchange transfusion. The case history of a 30-year-old female hepatic coma patient given 6 exchange transfusions in 3 days is given. Coma was reduced with each transfusion until full consciousness was restored. In liver-cell necrosis due to cirrhosis, coma treatment should only be considered when history, clinical features, biochemical findings, and endoscopic and histological criteria are compatible with prolonged survival. Until the actual causes of hepato-cerebral intoxication are known, each case will have to be judged on the overall clinical picture and a careful watch on the course of the disease..

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2489 **SCHISTOSOMIASIS.** *(Rev.)(Fr.)* Lapierre, J. *Presse Med.* 75(42):2111-2114, 1967.

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2492 **IATROGENIC JAUNDICE.** *(Rev.)(It.)* Cachin, M. *Minerva Med.* 58(82):3505-3511, 1967.

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2541 **DIRECT CYSTO-GASTRIC AND CYSTO-DUODENAL ANASTOMOSIS IN THE TREATMENT OF HYDATID CYST OF THE LIVER.** *(Fr.)* Burlui, D. (Surg. Clinic, Hosp. Tudor Vladimiresco, Bucharest, Rumania), M. Condiesco and G. Manesco. *Lyon Chir.* 64(2):220-224, 1968.

2542 **SELECTIVE ARTERIOGRAPHY IN LIVER CANCERS.** *(Fr.)* Honjo, I. (Fac. Med., U. Kyoto, Japan), T Suzuki and G. Yoshitomi. *Lyon Chir.* 64(2):235-241, 1968.

2543 **THE AMBIGUITY OF LIVER SARCOIDOSIS.** *(Ger.)* Vido, I. (Med. Clinic, U. Bratislava, Czechoslovakia). *Wien. Z. Inn. Med.* 49(4):142-144, 1968.

2544 **CLINICAL AND DIFFERENTIAL DIAGNOSIS PROBLEMS OF LIVER TUBERCULOSIS.** *(Ger.)* Dittrich, H. (Hanusch Hosp., Vienna, Austria). *Wien. Z. Inn. Med.* 49(4):149-151, 1968.

2545 **CHRONIC LIVER DISEASES AFTER OCCUPATIONAL EXPOSURE TO DICHLORODIPHENYLTRICHLOROETHANE (DDT) AND HEXACHLOROCYCLOHEXANE (HCH).** *(Ger.)* Schüttmann, W. (German Central Inst. for Occupational Med., Berlin, Germany). *Int. Arch. Gewerbepath.* 24(3):193-210, 1968.

2546 **WHAT IS THE PRESENT STATUS OF THERAPEUTIC POSSIBILITIES IN SERIOUS JAUNDICE DISEASES?** *(Fr.)* Caroli, J., J. P. Benhamou, C. Debray, M. Gaultier and L. Leger. *Presse Med.* 76(14):673-676, 1968.

2547 **ETIOCHOLANOLONE FEVER AND LIVER DISEASES.** *(Ger.)* Mühler, E. (Municipal Hosp., Saarbrücken, Germany) and K. Janoschek. *Med. Welt* (12):739-742, 1968.

2548 **CANCERS OF THE LIVER.** *(Fr.)* Rautureau, J. *Guide Pract.* (87):339-344, 1967.

2549 **UREASE IMMUNITY IN IRRADIATION INJURY WITH CONSIDERATION OF GROWTH AND LIVER INSUFFICIENCY.** *(E.)* Visek, W. J. (Dept. Animal Sci., Cornell U., Ithaca, N. Y.) and H. C. Dang. [Pp. 292-302 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept. 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology No. 1). Excerpta Medica 1968. 542 pp.]

2550 **IMMUNOPATHOLOGY OF LIVER DISEASES.** *(Fr.)* Nocton, F. *Gaz. Med. France* 74(15): 2895-2896, 1967.

2551 **HEPATOLENTICULAR DEGENERATION AND EARLY CANCER OF THE LIVER.** *(Fr.)* Girard, P. F., A. Vachon, M. Tommasi, P. Paliard, M. Rochet and J. Barthe. *Lyon Med.* (17):1395-1408, 1968.

2552 **URIDINE AND CYTIDINE IN THE TREATMENT OF HEPATIC COMA. PRELIMINARY NOTE.** *(It.)* Drago, G. (Hosp. St. Maria Nuova, Florence, Italy), P. Casetti and F. Nicosia. *Osped. Ital. Chir.* 17(6):651-657, 1968.

2553 **LABORATORY METHODS IN THE DIAGNOSIS AND TREATMENT OF LIVER DISEASES.** *(Ger.)* Kreutz, F. H. (Med. Clinic, U. Marburg, Germany). *Therapiewoche* 18(19):801-805, 1968.

2554 **EXOGENOUS AND ENDOGENOUS LIVER COMA INCLUDING PORTACAVAL ENCEPHALOPATHY.** *(Ger.)* Dolle, W. (Med. Clinic, U. Marburg, Germany). *Therapiewoche* 18(20):845-851, 1968.

2555 **HEMACHROMATOSIS DISEASES.** *(Fr.)* Dubrisay, J. *Vie Med.* (49):641-646, 1968.

2556 **THERAPEUTIC FUNDAMENTALS IN CHRONIC LIVER DISEASES.** *(Ger.)* Theuer, D. (Berlin, Germany), K. Wagner, G. Schneider and W. Schimmelpfennig. *Deutsch. Gesundh.* 23(6):253-257, 1968.

2557 **HEPATIC AND BILIARY CANCERS VISUALIZED BY HEPATOGANGLIAR THOROTRAST.** *(Fr.)* Batzenschlager, A., M. Weill-Bousson and A. M. Mandard. *Arch. Anat. Path. (Paris)* 15(4):295-300, 1967.

2558 **PARTIAL LIVER TRANSPLANTATION WITH PRIMARY REVASCULARIZATION IN DOGS: PRELIMINARY REPORT ON NEW METHOD AND ITS THEORETICAL BACKGROUND.** *(E.)* Aoki, H., T. C. Wang, H. Matsumura, T. Funabiki, Y. Kakumoto and T. Hatori. *Keio J. Med.* 16(4):205-222, 1967.

2559 **DEBRE-DETONI-FANCONI SYNDROME WITH HEPATIC GLYCOGENOSIS.** *(Ger.)* Bauer, B. *Klin. Wschr.* 46(6):317-327, 1968.

2560 **MISDIAGNOSIS OF AMOEBIC LIVER ABSCESS.** *(Ger.)* Hartmann, M. G. (Bernhard Nocht Inst. Naval & Tropical Dis., Hamburg, Germany). *Z. Gastroent.* 23(1):22-27, 1968.

2561 **ACTIVITY OF THE CELL-SAP FACTOR INHIBITING DNA SYNTHESIS OF RAT ASCITES HEPATOMA CELLS IN NORMAL TISSUES, VARIOUS MALIGNANT AND MINIMAL DEVIATION HEPATOMAS, AS WELL AS LIVERS DURING THE COURSE OF CARCINOGENESIS.** *(E.)* Terayama, H. and M. Sasada. *Gann* 59(1):51-60, 1968.

2562 **DIAGNOSTIC USE OF LIVER BIOPSY.** *(E.)* Schoenfield, L. J. *Minnesota Med.* 51(4):507, 1968.

2563 **NEW CONCEPTS IN THE OPERATIVE MANAGEMENT OF LIVER TRAUMA.** *(E.)* Tatooles, C. J., W. L. Wolfson and G. E. Block. *Proc. Inst. Med. Chicago* 27(2):36, 1968.

2564 **OBSTRUCTIVE JAUNDICE AND GASTROINTESTINAL HEMORRHAGE IN PROGRESSIVE SYSTEMIC SCLEROSIS.** *(E.)* Wildenthal, K., S. Schenker, J. D. Smiley and K. L. Ford. *Arch. Intern. Med.* 121(4):365-368, 1968.

2565 **MIXED MALIGNANT TUMOR OF THE LIVER IN AN ADULT.** *(E.)* Blanding, J. D. (Naval Hosp., San Diego, Calif.). *Arch. Path.* 86:108-110, 1968.

2566 **DIFFERENCES IN ACTIVITY AND INTRACELLULAR LOCALIZATION OF HEXOKINASE BETWEEN NORMAL RAT LIVER AND HEPATOMAS.** *(E.)* Sydow, G. *Acta Biol. Med. German* 20(1):1-6, 1968.

2567 **THE EVALUATION OF JAUNDICE.** *(E.)* Dordal, E. *Chicago Med.* 71(7):249-254, 1968.

2568 **ADRENO-HEPATIC UNION (ADRENAL DYSTOPIA).** *(E.)* Dolan, M. F. (US Naval Sch. Med., Bethesda, Maryland) and N. A. Janovski. *Arch. Path.* 86(1):22-24, 1968.

2569 **HEPATO-LINEAL FIBROSIS WITHOUT CIRRHOSIS: NON-CIRRHOTIC INTRAHEPATIC PORTAL HYPERTENSION.** *(E.)* Sherlock, S. (Roy. Free Hosp., London, England). *Postgrad. Med. J.* 44:109-111, 1968.

2570 **THE EPPING JAUNDICE AFTER TWO YEARS.** *(E.)* Kopelman, H. (St. Margaret's Hosp., Essex, England). *Postgrad. Med. J.* 44:78-81, 1968.

2571 **OXIDIZABLE RESIDUE OF BLOOD SERUM AND SERUM ELECTROLYTES IN HEPATARIC COMA.** *(E.)* Csapo, J. (Laszlo Hosp., Budapest, Hungary), J. Budai and G. Nyerges. *Acta Med. Acad. Sci. Hung.* 24(4):287-297, 1967.

2572 **METABOLIC CHANGES IN LIVER ASSOCIATED WITH SPONTANEOUS KETOSIS AND STARVATION IN COWS.** *(E.)* Ballard, F. J. (Temple U. Med. Sch., Philadelphia, Pa.), R. W. Hanson, D. S. Kronfeld and F. Raggi. *J. Nutr.* 95(2):160-172, 1968.

2573 **A TECHNIQUE OF ORTHOPTIC LIVER TRANSPLANTATION IN THE PIG.** *(E.)* Calne, R. Y. (Cambridge, England), D. E. Yoffa, H. J. O. White and R. R. Maginn. *Brit. J. Surg.* 55(3):203-206, 1968.

2574 **INTRAHEPATIC GRANULOMATOUS ARTERIOPATHY.** *(E.)* Fox, H. (Manchester Roy. Infirm.. England), M. H. Gleeson and W. F. W. E. Logan. *Postgrad. Med. J.* 44:256-259, 1968.

2575 **AUXILIARY LIVER-GRAFT WITHOUT PORTAL BLOOD: EXPERIMENTAL AUTOTRANSPLANTATION OF LEFT LIVER LOBES.** *(E.)* Van Der Heyde, M. N. (Gemeente Hosp., Arnhem, Netherlands) and L. Schalm. *Brit. J. Surg.* 55(2):114-118, 1968.

See also abstract nos.: 1730,1852,1860,1861,1862,1863,1869,1877

2576 **ACUTE CARBON TETRACHLORIDE HEPATOTOXICITY. V. ENZYMATIC ACTIVITY AND STRUCTURAL CONCOMITANTS DURING THE REGENERATIVE PHASE.** *(E.)* Dinman, B. D. (Inst. Indust. Hlth., Sch. Publ. Hlth., U. Michigan, Ann Arbor) and I. A. Bernstein. *Arch. Environ. Health (Chicago)* 16(6):777-784, 1968.

Serum and hepatic enzyme activity (glutamic-oxaloacetic transaminase, glutamic-pyruvic transaminase, lactic, malic, isocitric and glutamic dehydrogenases, and aldolase) were studied during the regenerative phase 16-72 hr after liver damage induced in rabbits by inhalation of CCl_4 vapors at concentrations of 100 and 2000 ppm. There was a significant increase in all serum enzymes between 24 and 36 hr after exposure to the lower concentration, even though serum lactic and glutamic dehydrogenase and aldolase had not increased during the period of acute response. Liver homogenate enzymes (except lactic and glutamic dehydrogenase and aldolase) increased from a minimum 16 hr after exposure to levels which were at least normal at 24 hr. Following exposure to 2000 ppm, all serum enzymes except lactic and malic dehydrogenase showed a significant rise between the 36th and 48th hr, but the liver enzyme showed a parallel increase only in the case of the transaminases. Liver enzyme activity showed a prompt return to normal levels, despite significant serum enzyme elevation, except in the case of glutamic dehydrogenase and aldolase which showed significant decreases in liver homogenates as late as 48 hr after exposure. Aldolase and lactic dehydrogenase continued to decrease following the acute drop in liver activity until the 36th hr, but then rose at 48-72 hr along with the isocitric and malic dehydrogenase. At both CCl_4 concentrations, the liver glutamic dehydrogenase remained significantly below normal until 72 hr after exposure. The types of structural alterations seen with more severe damage were markedly more common at 36 hr following exposure to the higher concentration of CCl_4. By 48 hr, in the livers of rabbits exposed to 100 ppm, lobular architecture had returned essentially to normal, glycogen was being deposited, and intense regenerative activity was seen. After 2000 ppm, however, the central vein area parenchyma had collapsed and round cell infiltrates were present, although intense regenerative activity could be seen in the periportal and midlobular areas. By 72 hr, considerable progress had been made toward reconstitution of normal hepatolobular morphology, but there was marked individual variation in response at both dose levels. Electron microscopy at 48 hr revealed an increase in microbodies or lysosomes and smooth vesicular elements of the ergastoplasm in the centrilobular cells. The rough ergastoplasm had either a linear or vesicular appearance, and ribonucleoprotein particles were once more prominently associated with these membranes. The mitochondria were either rounded and swollen or normal in size, and were partially surrounded by the rough ergastoplasm. It is concluded that the course of regenerative activity is related to the dose of CCl_4.

2577 **FRAGILITY OF LIVER MITOCHONDRIA IN ETHANOL-FED RATS.** *(E.)* French, S. W. (UCLA Sch. Med., Harbor Gen. Hosp., Torrance, Calif.). *Gastroenterology* 54(6):1106-1114, 1968.

Alterations in the liver mitochondria of male Wistar rats after chronic feeding of ethanol (accounting for 33.3-39.6% of the calories in the diet) were studied by manometric assay of succinic dehydrogenase activity and by electron microscopy of isolated liver mitochondrial fractions. Under the conditions of the experiment, the rate of the succinic dehydrogenase reaction was proportional to the rate of penetration of the electron acceptor phenazine methosulfate into the mitochondria. No effect was observed until the rats had been on the alcohol diet for at least 5 weeks. Even then, the mitochondrial permeability of alcohol-fed rats was no different from that of sucrose-fed controls for the first 30 min after isolation from the liver. By 60 min after isolation, a definite increase in permeability to phenazine methosulfate could be demonstrated in mitochondria from alcohol-fed rats; this difference in apparent succinic dehydrogenase activity was abolished by addition of calcium, which is known to destroy the membrane barrier to phenazine. Electron micrographs of assayed mitochondria showed that chronic ethanol feeding produced an increase in the number of mitochondria which have lost their outer membranes and cristae. This loss of mitochondrial outer membrane could be correlated with the loss of the permeability barrier to phenazine methosulfate. The effect of ethanol feeding persisted for 2-5 days after alcohol withdrawal. Indirect evidence indicated that neither microsomal contamination nor an increase in the number of lysosomes in the mitochondrial fraction could account for the ethanol-induced changes in apparent succinic dehydrogenase activity, since purification of the mitochondria did not alter the ethanol effect and since there was no increase in acid phosphatase activity in mitochondria from ethanol-fed rats. It is concluded that the mitochondrial fragility induced by feeding of ethanol is probably due to alterations in the mitochondrial membrane.

2578 **POSTOPERATIVE LIVER DAMAGE AND HALOTHANE ANESTHESIA.** *(Ger.)* Eger, W. (Dept. Exp. Pathol., U. Göttingen, Germany), H. Nassr-Esfahani and C. Schattenfroh. *Chirurg* 39(5):242-247, 1968.

In previously published animal experiments, a single period of halothane anesthesia 24 hr before poisoning with allyl alcohol had no effect on the degree of liver damage produced, but this was almost doubled when halothane was given 2 hr daily for 6 days. If the order was reversed and rats were first poisoned with allyl alcohol, halothane anesthesia for 2 hr beginning 1-2 hr later markedly increased the degree of liver damage, but halothane anesthesia begun 4 hr later, when the toxic effects of allyl alcohol had been dissipated, had no effect. It thus appears that repeated halothane anesthesia can sensitize the liver to other noxious influences, and that halothane itself can aggravate the liver damage previously caused by other factors. In the course of this review, these experimental findings are related to the fact that the incidence of postoperative jaundice increased from 0.16% in 1955-58, when ether and barbiturates were in general use, to 0.89% in 1961-64, after the introduction of halothane anesthesia; in 1964, in fact, the incidence in the authors' clinic was 1.3%. Among 15 cases observed recently, 7 ended in death (6 of 7 due to hepatic dystrophy or coma); 3 of these cases (2 men and 1 woman, 50-60 yr old) are presented in detail in order to demonstrate that halothane can produce significant parenchymal damage and necrosis in livers previously sensitized by cholangiohepatitis, diabetic fatty infiltration, or cellular edema. This interaction between previous cholangiohepatitis and halothane toxicity has also been confirmed by experiments in which rats were subjected to biliary ligation followed by daily anesthesia with halothane (2-6 hr/day) for 3 days. Parenchymal damage and necrosis were markedly increased by halothane, but not the inflammation or fatty infiltration *per se*, so that the term "halothane-hepatitis" is felt to be a misnomer. It is concluded that halothane exerts a definite toxic effect on the liver which is manifested as jaundice or hepatic necrosis only in the presence of predisposing factors such as stress, shock, infection, fatty infiltration or cholangiohepatitis.

2579 **ALCOHOL, DIET, AND EXPERIMENTAL HEPATIC INJURY.** *(E.)* Hartroft, W. S. (Dept. Physiol., U. Toronto, Ontario, Canada) and E. A. Porta. *Canad. J. Physiol. Pharmacol.* 46(3):463-473, 1968.

A literature review is given of investigations of the capability of lipotropic factors and protein in the diet to protect against fatty livers and cirrhosis in alcoholism. Three investigative approaches are listed: 1) experimental diets with alcohol supplied in drinking water comprising 27% of calories; 2) fluid diets with alcohol comprising 36% of calories; 3) semisynthetic diets with an ethanol-sucrose mixture in place of drinking water, comprising 40-60% of calories. Results of these experiments did not support a direct hepatotoxic action of alcohol. Rats with established cirrhosis, when treated by an alcoholic diet which contained abundant lipotropes and protein, showed regression of the cirrhosis, whereas Mallory bodies (alcoholic hyaline) formed in the liver cells of rats fed alcohol if the basal diet was inadequate and were even seen in livers of rats fed other inadequate diets without alcohol. The mitochondrial nature of these bodies is described. It is concluded that if the rat diet is suitably designed, large alcoholic intake for weeks or months can be sustained without injury to the rat liver.

2580 **HEPATIC NECROSIS FOLLOWING HALOTHANE ANESTHESIA.** *(E.)* Kelley, J. (U. Alabama Med. Ctr., Birmingham) and R. E. Miller. *Alabama J. Med. Sci.* 5(2):204-208, 1968.

A female patient who had received halothane (2-bromo-2-chloro-1,1,1-trifluoroethane) anesthesia twice within 5 weeks developed hepatic necrosis; death followed 29 days after the onset of symptoms. At autopsy, the liver, weighing 950 g, had a yellow tan color and exhibited mass necrosis. The patient had a past history of allergies to penicillin, sulfa drugs, molds, eggs, and dairy products; this allergic history, the occurrence of hepatic necrosis after a second halothane administration, and the finding of hepatic necrosis in other patients after exposure to halothane suggests a hypersensitivity response.

2581 **SERUM AMINO ACID CONCENTRATIONS IN ALCOHOLIC HEPATITIS.** *(E.)* Ning, M. (Harvard Med. Sch., Boston, Mass.), L. M. Lowenstein and C. S. Davidson. *J. Lab. Clin. Med.* 70:554-562, 1967.

Fasting serum amino acid levels were measured in 24 alcoholic hepatitis patients to study the malnutritional aspects of the condition; blood samples were taken every third day for 10 days and approximately every week thereafter until death or until the patient was discharged. The patients were withdrawn from alcohol, and given a normal protein diet, bed rest, vitamin K administrations and diuretics; 20 normal subjects and 29 patients with other forms of liver disease were used as controls. Serum alpha-amino nitrogen was measured on a Technicon analyzer. Alcoholic hepatitis patients had normal concentrations of serum alpha-amino nitrogen and an increased ratio of serum nonessential amino acids; they had increased concentrations of glutamic acid and usually lower levels of valine, leucine and isoleucine, which returned to normal as the patients improved. The altered amino acid ratio and pattern in alcoholic hepatitis are probably due to protein deficiency. Similar results are seen in kwashiorkor and after hepatectomy.

2582 **DIETARY PROTEIN AND CHRONIC INTOXICATION WITH ETHANOL.** *(E.)* Lucas, C. C. (Dept. Med. Res., U. Toronto, Canada), J. H. Ridout and G. L. Lumchick. *Canad. J. Physiol. Pharmacol.* 46(3):475-485, 1968.

The effects of various dietary protein regimens (6%) on alcohol intoxication were investigated in 6 groups of 30 male Wistar rats, weighing 150-190 g at the onset of the experiment; the animals received 5-5.5 ml of 20-40% (volume/volume) of ethanol by stomach tube four times a week; some rats received as many as 200 doses of alcohol. The type of protein given affected the degree of intoxication. Animals fed diets that promoted the best growth (whole-egg protein, 2% animal and 4% vegetable protein, and milk protein) were generally less inebriated, but the relationship is not a simple one. The development of a tolerance was obvious in whole-egg and mixed protein-fed rats; milk protein-fed animals showed less of a tolerance. Rats fed oat, rye and peanut meal grew less and developed less of a tolerance for alcohol. Milk appeared to favor better absorption, or poorer utilization of alcohol, than did other protein sources, but it would be idle to speculate upon an explanation until more facts have been ascertained.

2583 **DRAINAGE OF THE COMMON BILE DUCT IN EXPERIMENTAL INJURY TO THE LIVER.** *(E.)* Wasowski, J. R. (3d Surg. Clin. Acad. Med., Gdansk, Poland). *Amer. J. Surg.* 115(6):787-794, 1968.

2584 **MODERN VIEWPOINTS ON THE CLINIC OF SUBCUTANEOUS LIVER INJURIES.** *(Rus.)* Stucke, K. (Surg. Clin., U. Würzburg, Germany). *Munch. Med. Wschr.* 110(15):930-936, 1968.

2585 **A NEW EXPERIMENTAL APPROACH IN THE STUDY OF CHRONIC ALCOHOLISM. II. EFFECTS OF HIGH ALCOHOL INTAKE IN RATS FED DIETS OF VARIOUS ADEQUACIES.** *(E.)* Cesar, L. A. (Res. Inst. Hosp. Sick Children, Toronto, Canada), M. D. Gomez-Dumm, E. A. Porta, W. S. Hartroft and O. R. Koch. *Lab. Invest.* 18(4):365-378, 1968.

2586 **A NEW EXPERIMENTAL APPROACH IN THE STUDY OF CHRONIC ALCOHOLISM. I. EFFECTS OF HIGH ALCOHOL INTAKE IN RATS FED A COMMERCIAL LABORATORY DIET.** *(E.)* Porta, E. A. (Res. Inst. Hosp. Sick Children, Toronto, Canada), L. A. Gesar and M. D. Gomez-Dumm. *Lab. Invest.* 18(4):352-364, 1968.

2587 **A NEW EXPERIMENTAL APPROACH IN THE STUDY OF CHRONIC ALCOHOLISM. III. ROLE OF ALCOHOL VERSUS SUCROSE OR FAT-DERIVED CALORIES IN HEPATIC DAMAGE.** *(E.)* Koch, O. R. (Res. Inst. Sick Children, Toronto, Canada), E. A. Porta and W. S. Hartroft. *Lab. Invest.* 18(4):379-386, 1968.

2588 **SO-CALLED CHOLESTATIC AND CHOLANGIOLYTIC HEPATITIS.** *(Rus.)* Slyshko, V. N. (Med. Inst., Rostov-on-Don, USSR), V. N. Lazarev, V. Ie. Rychnev, G. M. Topalov and K. D. Shaov. *Vrach. Delo.* (5): 17-20, 1968.

2589 **USE OF ETHYL ALCOHOL TO PREVENT HEPATIC LESIONS INDUCED BY ALLYL ALCOHOL.** *(Fr.)* Schwarzmann, V. (Inst. Nat. Health & Med. Res., Paris, France), R. Infante, A. Raisonnier and J. Caroli. *C. R. Soc. Biol. (Paris)* 161(12):2425-2429, 1967.

2590 **METABOLIC LIVER DISEASES: FATTY LIVER INCLUDING ALCOHOLIC LIVER DISEASE, HEMACHROMATOSIS, AND WILSON'S DISEASE.** *(Ger.)* Strohmeyer, G. (Med. Clinic, U. Marburg a. d. Lahn, W. Germany). *Therapiewoche* 18(20):856-862, 1968.

2591 **THE PROBLEM OF WHETHER HALOTHANE ENHANCES ALLYL ALCOHOL DAMAGE TO RAT LIVER.** *(Ger.)* Scholler, K. L. (Med. Clinic, U. Freiburg, Germany) and R. Schröter. *Klin. Wschr.* 46(4):207-208, 1968.

2592 **PRELIMINARY PATHOLOGIC-HISTOLOGIC NOTES ON GRANULOMATOUS HEPATITIS,** *(Ger.)* Obiditsch-Mayer, I. (Path.-Anat. Inst., U. Vienna, Austria). *Wien. Z. Inn. Med.* 49(4):141-142, 1968.

2593 **OBSERVATIONS ON THE CLINICAL PROBLEMS OF GRANULOMATOUS HEPATITIS.** *(Ger.)* Gros, H. (Municipal Hosp., Saarbrücken, Germany). *Wien Z. Inn. Med.* 49(4):151-158, 1968.

2594 **ACUTE EFFECTS OF 3-METHYL-4-DIMETHYLAMINOAZOBENZENE INTOXICATION ON RAT LIVER: STRUCTURAL AND FUNCTIONAL CHANGES IN THE ENDOPLASMIC RETICULUM AND NADPH-RELATED ELECTRON TRANSPORT.** *(E.)* Arcasoy, M., E. A. Smuckler and E. P. Benditt. *Amer. J. Path.* 51(5):841-868, 1967.

2595 **PIGMENTARY AND PROTEIN METABOLISM CHANGES IN TOXIC AFFECTIONS OF THE LIVER WITH A COMPLEX OF SUBSTANCES TECHNOLOGICALLY USED IN THE PRODUCTION OF SYNTHETIC RUBBER.** *(Rus.)* Ivanova-Tikhvinskaya, E. L. *Gig. Tr. Prof. Zabol.* 12(3):31-35, 1968.

2596 **INFECTIOUS-MONONUCLEOSIS-LIKE SYNDROME FOLLOWING HEMODIALYSIS FOR CARBON TETRACHLORIDE POISONING.** *(E.)* Proudfoot, A. T. (Roy. Infirm. Edinburgh, Scotland) and R. H. Macdonald. *Postgrad. Med. J.* 44:249-251, 1968.

2597 SERUM CONCENTRATIONS AND RENAL CLEARANCES OF AMINO ACIDS IN PATIENTS WITH CHRONIC ACTIVE HEPATITIS. *(E.)* Krawitt, E. L. (U. Iowa Coll. Med., Iowa City) and J. A. Clifton. *Gastroenterology* 54(5):866-871, 1968.

In 4 patients (2 males, 24-56 yr old, and 2 females, 12-18 yr old) with chronic active hepatitis of 4-9 months duration, determinations of the serum concentrations of 17 amino acids revealed a 20-fold increase in methionine (to 10.7-11.1 mg%) in the 2 girls, along with elevation of tyrosine, histidine, lysine and aspartic acid, while the 2 men only showed slight elevation of methionine and tyrosine plus (in one case) abnormally high levels of histidine. The initial serum bilirubin was 5.8-6.9 mg% in the 2 girls and 2.5-2.9 mg% in the 2 men, the serum glutamic oxaloacetic transaminase was 400-900 U in the 2 girls and 178-660 U in the 2 men, and the alkaline phosphatase was 3.3-5.0 U in the girls and 3.2-11.0 U in the men. Treatment with prednisone (30-60 mg/day) decreased the levels of all the amino acids except cystine, phenylalanine and leucine in the 2 girls, parallel with clinical improvement, but had little effect in the one man who was treated. When treatment of the girls was discontinued, methionine and tyrosine levels again rose above normal. Renal clearances for all the amino acids were within normal limits in all 3 patients studied. The cause of the abnormally high serum amino acid levels in these patients remains unknown, as does the mechanism of the effect of glucocorticoid therapy.

2598 REFLECTIONS UPON THE INCIDENCE OF POSTTRANSFUSION HEPATITIS IN VARIOUS PARTS OF THE WORLD. *(E.)* Senior, J. R. (Philadelphia Gen. Hosp., Pa.). *Amer. J. Gastroent.* 49(4):298-303, 1968.

Among 56 patients subjected to serial chemical tests and physical examinations for 6 months after transfusion with a total of 115 units of blood (1-8 units/patient), 10 (18%) showed evidence of anicteric hepatitis; these 10 included all 5 patients given 6 or more units of blood. The time from transfusion to the first detectable increase in serum transaminase or isocitric dehydrogenase levels was 25-101 days, and there was no increase in serum bilirubin. All 6 patients biopsied showed signs of hepatic inflammation with portal round-cell infiltration, parenchymal nuclear pleomorphism, ballooning of cells, acidophilic bodies, and cellular pigment accumulation, along with abnormal sulfobromophthalein retention. These data indicate that approximately 9% of the units of blood used (and therefore approximately 9% of the donor population) carried an agent which was able to induce hepatitis. In a comparable Japanese study, 64.6% of 175 patients given massive blood transfusions developed anicteric hepatitis, and 10% were actually jaundiced. These patients, however, received a total of 1907 units (an average of 10.9 units apiece compared to the American average of 2.09), yielding a hepatitis carrier rate of about 10-12%. The carrier rate thus seems to be roughly comparable throughout the world, although other factors (e.g., age, host resistance) may determine whether the recipient of a transfusion develops recognizable hepatitis. It is also pointed out that the incidence of hepatitis seems to fluctuate in 7-yr cycles, 1966-67 representing a trough following two peaks in 1953-54 and 1960-61. It is thought to be quite likely that the carrier rate would also be higher in periods of increased hepatitis prevalence. The detection of carriers still presents insurmountable difficulties, since they are not revealed by the usual liver-function tests. The only workable prophylactic measure is to transfuse as few units of blood as possible in each individual case, since the prevention of transfusion hepatitis by steroids or concomitant administration of gammaglobulin is still in the experimental stage.

2599 INFECTIOUS HEPATITIS AND PREGNANCY. *(E.)* D'Cruz, I. A. (Lokmanya Tilak Munic. Gen. Hosp., Sion, Bombay, India), S. G. Balani and L. S. Iyer. *Obstet. Gynec.* 31(4):449-455, 1968.

Among 225 women (all 15-45 yr old except for 10 who were postmenopausal) admitted to the hospital with jaundice (assumed but not proven to be due to viral hepatitis) in 1965-66, 134 were pregnant (8 in the 1st, 45 in the 2nd and 81 in the 3rd trimester), 9 were in the puerperium, having delivered recently elsewhere, and 82 were nonpregnant. The incidence of viral hepatitis was approximately 0.31% of all pregnancies, and was highest in the summer months (July-October). The mortality rate was 53.8% in the pregnant and puerperal group and 25.6% in the nonpregnant group, and death due to acute hepatic failure accounted for 20.4% of all maternal deaths during this period. The prognosis could not be correlated directly with the severity of jaundice, although a serum bilirubin of 11 mg% or higher was seen in 34% of the fatal cases and 25% of the survivors. Hepatic coma developed in 103 cases (82 pregnant or puerperal and 21 nonpregnant), and only 5 of these patients survived. The high mortality rate is ascribed to the fact that 75% of the cases of hepatic coma occurred during the first 10 days of illness, often before hospitalization, as well as to the generally poor nutritional state and widespread anemia. In 25 cases the fatal outcome may have been hastened by parenteral tetracycline. In 31 of the pregnant group there was a massive uterine hemorrhage, and even without hemorrhage there was often a sudden deterioration into deep coma and irreversible shock immediately postpartum. Among the 134 pregnant patients, 49 were discharged before delivery, 46 died undelivered, and 39 delivered, but 31 of these 39 subsequently died. Only 9 viable infants were produced, the other 30 being either term stillbirths (7) or premature stillbirths (23).

2600 FIBROSING ALVEOLITIS AND CHRONIC LIVER DISEASE. *(E.)* Turner-Warwick, M. (Brompton Hosp., London, England). *Quart. J. Med.* 37(145): 133-149, 1968.

The clinical, biochemical and immunological findings are reported for 8 patients (3 men and 5 women, 25-75 yr old) with fibrosing alveolitis (chronic Hamman-Rich syndrome) and chronic liver disease confirmed by biopsy, in whom non-organ-specific autoantibodies and increased titers of circulating immunoglobulins were detected. Histologically, the liver showed chronic active hepatitis in 5 cases, 3 of 5 with cirrhosis, and interlobular hepatitis in 3 cases. All 8 patients had hepatomegaly, 4 had splenomegaly, and 6 of 6 tested had elevated erythrocyte sedimentation rates, but only 2 had borderline jaundice and only 2 had serious symptoms of hepatic disease: portal hypertension in one case and hepatic failure plus portosystemic encephalopathy in another. Serum transaminase levels were elevated in 3 cases and alkaline phosphatase in 4. A follow-up of 1-9 yr revealed parallel progress or regression of the disease in the lungs and the liver in 7 of the 8 cases: 1 of 7 showed improvement in both following corticosteroid therapy, 1 of 7 showed arrest of the disease in both organs following corticosteroids, and 5 of 7 showed progression of both diseases (despite corticosteroids in 3 of 5). The 8th patient developed ulcerative colitis 5 yr after the onset of respiratory symptoms and 2 yr before death, at which time autopsy revealed active interlobular hepatitis. Serological studies revealed rheumatoid factors in 2 cases, antinuclear factors in 5, occasional LE cells in one, thyroid specific antibodies in 3, antibodies specific to smooth muscle in 3, and nonspecific autoimmune antibodies in 5. It is suggested that the concurrent development of disease in the lungs and liver is probably due to a basic disturbance in the immune mechanisms of the body.

2601 **SOME INDICES OF FAT AND LIPID METABOLISM DURING THE COURSE OF EPIDEMIC HEPATITIS IN CHILDREN.** *(Rus.)* Shamsiev, S. Sh. (Tashkent Med. Inst., Uzbekistan, USSR) and A. Abduazimov. *Med. Zh. Uzbek.* (2):14-17, 1968.

Biochemical studies on 101 children (1-14 yr old) with viral hepatitis (22 mild, 41 moderately severe, and 38 severe cases) and 20 healthy controls revealed significant increases in serum total lipids, cholesterol, nonesterified fatty acids, phospholipids, β-lipoproteins and ketone bodies in all stages of the disease. The hyperlipemia was proportional to the severity of the illness, and decreased to normal levels after successful treatment. The maximal average values detected (in the acute stage of severe hepatitis) were 1074 mg% total lipids, 243 mg% cholesterol, 1.56 μEq/liter unesterified fatty acids, 418 mg% phospholipids, 956 mg% β-lipoproteins, and 2.53 mg% ketone bodies, compared to control values of 527, 137, 0.32, 161, 473, and 1.36, resp.

2602 **THE CLINICAL PICTURE OF HEPATITIS IN PATIENTS WITH CHRONIC BRUCELLOSIS.** *(Ger.)* Boron, P. (Infect. Dis. Clin., Med. Acad., Bialystok, Poland). *Wien. Z. Inn. Med.* 49(4):144-149, 1968.

Clinical and laboratory studies of 67 patients (52 men and 15 women, 16-51 yr old) with chronic brucellosis revealed that mild hepatic involvement plays a significant role in many patients with this disease. While 14.9% of the patients reported upper abdominal pain and 7.4% had pain in the right costal arch, only 1.4-3.0% had other gastrointestinal symptoms which could be referred to the liver. However, 59.7% showed painful hepatomegaly on palpation, 11.9% had lymphadenopathy, and 4.4-5.9% had splenomegaly, jaundice or a subfebrile body temperature. Sulfobromophthalein retention was abnormal in 82%, and 11.9-35.8% had other positive liver function tests. Glutamic-oxaloacetic and glutamic-pyruvic transaminase were elevated in 31.3-52.2%, alkaline phosphatase in 11.9%, and aldolase in 38.2%. Serum ceruloplasmin was elevated in 32.3% and cholinesterase was subnormal in 93.7%. Electrophoretic studies of the serum proteins revealed generalized dysproteinemia, with hyperproteinemia in 41.4%, hypoalbuminemia in 54.8%, and elevated levels of α_2- and γ-globulins in 48.4-77.4%. In many patients, ^{131}I-Rose Bengal tests yielded abnormal hepatic radioactivity curves resembling those in viral hepatitis. Liver biopsy revealed focal changes resembling granuloma, alon with focal necrosis and inflammatory infiltrates composed of mononuclear cells.

2603 **AN INTRALUMINAL STUDY OF LIPID AND PROTEIN DIGESTION AND ABSORPTION IN ACUTE HEPATITIS.** *(It.)* Fontana, G. (Inst. Spec. Med. Pathol., U. Bologna, Italy), L. Barbara, P. Azzaroli, D. Lo Brun and G. A. Lanfranchi. *Riv. Gastroent.* 19(5):271-305, 1967.

In 18 patients (9 men and 9 women, 18-45 yr old) with acute icterigenic hepatitis (direct serum bilirubin of 3.90-16.08 mg%) and in 10 normal controls, the digestion and absorption of lipids and proteins were studied by serial sampling from the stomach, duodenum, jejunum and ileum, using a multiple catheter, during passage of a test meal consisting of an equilibrated mixture of fats, proteins and carbohydrates (powdered milk, corn oil, glucose, human serum albumin and polyethylene glycol). Protein digestion was evaluated from the behavior of ^{51}Cr-labeled serum albumin by determining the proportion of nonprecipitatable radioactivity in each sample of intestinal contents. Lipid digestion was evaluated in two ways: by determining the ratio between free fatty acids and total fat in each sample, and from the ratio between the amount of neutral fat in the sample and that in an equal volume of the test meal. Lipid absorption was determined from the ratio between the total fat and the nonabsorbable polyethylene glycol in each sample of intestinal contents, each expressed as a percentage of their content in an equal volume of the test meal. Both pro tein and lipid digestion were generally within normal limits, with the exception of a few cases in which a mild duodenal or jejunal deficiency was compensated for in the distal ileum. More than 90 min after ingestion of the test meal, 21-22% of the protein and 29-30% of the lipid had been digested in the stomach contents, 33-36% and 45-61%, resp., in the duodenal contents, 47-49% and 54-68%, resp., in the jejunal contents, and 80-82% and 51-69%, resp., in the ileal contents; the higher percentages for lipid digestion at each level were obtained in the patients with acute hepatitis. Although these differences were not statistically significant, patients with acute hepatitis showed a consistent, more or less marked deficiency in lipid absorption. At the same time period ($>$90 min after ingestion), 72%, 83% and 82% of the lipids had been absorbed in the normal duodenum, jejunum and ileum, resp., compared to 48%, 67% and 68% in samples taken from patients with acute hepatitis. This defect in lipid absorption disappeared with the disappearance of jaundice, and is ascribed to cholestasis and chang in the composition of the bile salts during hepatitis. It is also possible that alterations in the intestinal mucosa or increased steatorrhea may play a role.

2604 **UNUSUAL FEATURES OF VIRAL HEPATITIS IN ACCRA, GHANA.** *(E.)* Morrow, R. H. Jr. (Dept. Prev. Med., Kampala, Uganda), H. F. Smetana, F. T. Sai and J. H. Edgcomb. *Ann. Int. Med.* 68(6):1250-1264, 1968.

A clinical, epidemiological and histopathological study was carried out on 136 patients (76 males and 60 females, most

15-44 yr old but including 15 children) admitted to Korle Bu Hospital in Accra during 1962-63 with a histologically confirmed diagnosis of viral hepatitis (liver biopsy or autopsy). Histopathologic examination of liver biopsy sections from 128 of these patients revealed a distinctive pattern with 3 unusual features: a very high incidence (92%) of "glandular" transformation with regrouping and reorientation of hepatocytes within trabeculae to form glandular structures around a centrally situated canaliculus, an increased frequency (63%) of cholestasis, and a rarity of acidophilic bodies compared to other populations with hepatitis. Glucose-6-phosphate dehydrogenase deficiency was found in 16 of 40 males and 8 of 31 females, which is double the rate in the general Accra population, and was associated with increased cholestasis. The most common clinical features were a history of dark urine, malaise, anorexia, nausea, jaundice and hepatomegaly, lasting for an average of 13-32 days after admission; 70% had a serum bilirubin of more than 10 mg%. Fever and hepatomegaly were more prominent in children, who generally tolerated hepatitis well and recovered rapidly compared to the adults. Treatment was by modified bed-rest, a high-protein diet supplemented by multiple vitamins, and chloroquine for malaria prophylaxis; patients with signs of impending coma (21 cases) received a low-protein diet and sulfaguanidine or neomycin. The complication rate was significantly higher for pregnant women, coma developing in 7 of 21 pregnant and postpartum females compared to 2 of 26 nonpregnant females. It is particularly striking that 2 women who went into spontaneous labor while comatose improved dramatically after delivery. The fetal and perinatal loss rate was 60% (9 of 15 newborns). Coma developed in a total of 17 cases, 10 of whom died. The overall mortality was 10% (13 deaths attributable to hepatitis and 2 unrelated deaths); 109 patients eventually recovered completely, and 31 had a prolonged course of more than 3 months. A longer, more severe course of hepatitis was associated with glucose-6-phosphate dehydrogenase deficiency (which is thought to hinder the repair of hepatic damage), male sex, and older age. The high rates for acute hepatic coma and mortality were associated with immigration, shantytown residence, lower socioeconomic standing, and pregnancy. On the other hand, prolonged jaundice from hepatitis could be attributed to inherent biological factors such as age, sex and enzyme deficiency. It is suggested that the unusual "glandular" transformation seen in these patients and those in a recent Indian study is due to a reorganization of liver cords or plates in an attempt to facilitate hepatic metabolism and secretory function.

2605 **VIRAL HEPATITIS EVALUATION BY MEANS OF RADIOSOTOPES.** *(E.)* Schwartz, R. D. (Danbury Hosp., Conn.) and N. E. Herrera. *Amer. J. Gastroent.* 48(3):204-210, 1967.

Liver scanning after i.v. administration of ^{131}I-Rose Bengal was used to follow the course of 8 patients with documented viral hepatitis. The results of this technique, which simultaneously measures the functional capacity of the liver to take up dye and the morphological status, were correlated with the results of conventional liver function tests and aspiration biopsy. Two cases followed for 4 and 15 months are presented in detail, with the results of 8 isotope studies. One case, a 24-yr-old Caucasian male with acute viral hepatitis, showed marked impairment of function, hepatomegaly, and diffuse "mottling" on the scan. Despite the presence of "bridging" in the biopsy, steroids were withheld since a repeat scan showed improvement in function and appearance. Although initial results were good, cirrhosis developed in the left lobe after about 4 months. The other case, a 56-yr-old Negro female with marked liver impairment, was treated with corticosteroids and showed classical improvement in both functional and morphologic status, despite development of hyperadrenalism. Radioactive Rose Bengal is felt to provide an accurate way of evaluating the extent of functional and morphological damage and the prognosis in viral hepatitis. It is pointed out, however, that adequate criteria for the interpretation of the isotope studies are still lacking.

2606 **FOUR CASES OF VIRAL HEPATITIS WITH AN UNUSUAL ONSET.** *(It.)* Menicagli, V. (United Hosp., Livorno, Italy). *Minerva Med.* 58(80):3421-3423, 1967.

2607 **HEPATITIS IN THE AGED (SPECIAL FEATURES OF THE CLINICAL PICTURE, PATHOGENESIS, AND THERAPY).** *(Rus.)* Titov, M. B. (L'vov Med. Inst., USSR). *Sovet. Med.* (3):47-52, 1968.

2608 **TWO CASES OF HEPATITIS DUE TO *TOXOPLASMA GONDII.*** *(E.)* Vischer, T. L. (Med. Polyclin., U. Geneva, Switzerland), C. Bernheim and E. Engelbrecht. *Lancet* 2(7522):919-921, 1967.

2609 **MURINE HEPATITIS VIRUS: EFFECT ON LIVER RNA.** *(E.)* Tsuji, T. (U. Alabama Med. Ctr., Birmingham), B. I. Hirschowitz and G. Sachs. *Science* 159(3818):987-990, 1968.

2610 **RELATION OF HEPATITIS TO SELF-INJECTION TECHNIQUES.** *(E.)* Bewley, T. H. (Tooting Bec Hosp., London, England), O. Ben-Arie and V. Marks. *Brit. Med. J.* 1(5594):730-731, 1968.

2611 **CONSIDERATIONS ON THE VIROLOGY OF HEPATITES.** *(It.)* Monteiro, E. F. (Oswaldo Cruz Inst., Rio de Janeiro, Brazil). *Folha Med.* 56(2):69-84, 1968.

2612 **FUNCTIONAL STATE OF THE LIVER IN ULCER DISEASE PATIENTS FOLLOWING GASTRIC RESECTION.** *(Rus.)* Mykuliak, V. G. (Ternopol' Med. Inst., USSR). *Klin. Med. (Moskva)* 46(5):52-58, 1968.

2613 **THE CONCENTRATING CAPACITY OF THE GALLBLADDER IN PATIENTS WITH CHRONIC HEPATITIS.** *(Ger.)* Tarnopolskaja, P. D. (Inst. Nutr., Acad. Med. Sci., Moscow, USSR). *Radiol. Diagn.* 9(1):9-18, 1968.

2614 **ACUTE VIRAL HEPATITIS. EXPERIENCE DURING THE LAST 10 YEARS.** *(Sp.)* Mazzei, E. S. (Clin. Hosp., Buenos Aires, Argentina), T. H. Celsi and F. G. Lasala. *Prensa Med. Argent.* 55(3):156-159, 1968.

2615 **CONTRIBUTION TO THE STUDY OF ELECTROCARDIOGRAPHIC ALTERATIONS IN THE COURSE OF VIRAL HEPATITIS.** *(It.)* Fedi, A. (Inst. Gen. Clin. Med., U. Siena, Italy), G. Scalise and C. A. Boggiano. *Rass. Int. Clin. Ter.* 48(7):383-389, 1968.

2616 THE ACTION OF PHOSPHATEMIA IN THE COURSE OF INFECTIOUS HEPATITIS. *(It.)* Castello, D. (Pediat. Clinic, U. Turin, Italy) and G. Ghidella. *Minerva Pediat.* 20(11):615-616, 1968.

2617 VIRAL HEPATITIS. *(Ger.)* Frosch, B. (Med. Clinic, U. Heidelberg, W. Germany). *Deutsch. Med. J.* 19(10):359-364, 1968.

2618 CHRONIC HEPATITIS. *(Ger.)* Kommerell, B. (Med. Clinic, U. Heidelberg, W. Germany) and P. Barth. *Deutsch. Med. J.* 19(10):364-369, 1968.

2619 EPIDEMIC [VIRAL]HEPATITIS IN THE INFANT. *(Fr.)* Salet, J. (Hosp. Trousseau, Paris, France). *Cah. Coll. Med. Hop. Paris* 9(5):471-478, 1968.

2620 APLASTIC ANEMIA FOLLOWING VIRAL HEPATITIS. *(Ger.)* Stieglitz, R. (Berlin, Germany) and D. Kranz. *Deutsch. Gesundh.* 23(6):241-245, 1968.

2621 TREATMENT OF RESIDUAL COMPLAINTS FOLLOWING INFECTIOUS HEPATITIS AT THE PIATIGORSK HEALTH RESORT. *(Rus.)* Osipov, Iu. S. (Piatigorsk Health Resort, USSR). *Vop. Kurort* (1):11-16, 1968.

2622 BLOOD TRANSAMINASE ACTIVITY IN PATIENTS WITH RESIDUAL COMPLAINTS FOLLOWING INFECTIOUS HEPATITIS DURING HEALTH RESORT THERAPY. *(Rus.)* Kulikova, G. F. (Piatigorsk Health Resort, USSR). *Vop. Kurort* (1):16-21, 1968.

2623 EFFECT OF SALINE-ALKALINE AND CARBONATE BEARING WATERS ON HEPATIC PROTEIN FORMATION IN ANIMALS WITH EXPERIMENTAL HEPATITIS. *(Rus.)* Kudlaenko, K. I. *Vop. Kurort* (1):21-27, 1968.

2624 AN EPIDEMIC OUTBREAK OF INFECTIVE HEPATITIS. *(E.)* Bhadury, T., B. Raj and Y. D. Dubey. *J. Indian Med. Ass.* 50(2):63-70, 1968.

2625 RECENT TRENDS IN ACUTE VIRAL HEPATITIS. *(E.)* Saunders, S. J. (Dept. Med., U. Cape Town, South Africa). *Postgrad. Med. J.* 44:102-105, 1968.

See also abstract nos.: 1720,1875,2481

2626 **HEPATIC CIRRHOSIS: A PROBLEM IN COMMUNICATION.** *(E.)* Popper, H. (Mt. Sinai Sch. Med., New York City) and F. Schaffner. *Israel J. Med. Sci.* 4(1):1-7, 1968.

Considerations influencing the classification of cirrhosis are reviewed from a historical, partly subjective, viewpoint. The apparent change in the appearance of the cirrhotic liver from predominance of the so-called Laennec's type to that of the postnecrotic form is explained by changes in nutrition. Etiologic factors have a limited influence on the appearance of the end stage of cirrhosis. It seems, therefore, more profitable to emphasize the principle of cirrhosis rather than its classification. For the limited needs from the point of view of communication, it is proposed to separate a regular from an irregular type of cirrhosis. The few diagnostic features permitting recognition of the etiology are listed.

2627 **THE PATHOGENESIS OF CIRRHOSIS OF THE LIVER IN THE MIDDLE EAST (A STUDY OF 210 CASES).** *(E.)* Munzer, D. (Damascus Hosp., Syria). *Amer. J. Gastroent.* 49(3):241-250, 1968.

Among the 210 patients (156 males and 54 females, mean age 35 yr, and 69% below the age of 40) treated for cirrhosis of the liver, 61% had a history of malaria, 66% had malnutrition, and 56% had both malnutrition and previous malaria, while relatively few had the more familiar antecedents of hepatitis (17 cases), alcoholism (12), extrabiliary obstruction (6), typhoid fever (5), syphilis (4), or chemical poisoning (3). Splenomegaly was present in a high proportion of all types (total of 142 cases). The diagnosis was biliary cirrhosis in 89 cases (46 incipient and 43 established), portal cirrhosis in 88 (incipient in 26), postnecrotic cirrhosis in 23, syphilitic cirrhosis in 4 and cardiac cirrhosis in 6. It is concluded that cirrhosis is the end result of many forms of hepatic disease differing in origin and natural history. Chronic malnutrition (especially protein deficiency which increases the susceptibility to hepatitis and bilharziasis), viral and toxic hepatitis, alcoholism and parasitic diseases are all contributory causes, the importance of which varies with geography and culture. On the basis of limited experience with a few cases, splenectomy is recommended in parasitic splenomegaly or incipient cholestatic cirrhosis, but not in advanced biliary cirrhosis or portal cirrhosis.

2628 **THE NATURAL HISTORY OF CIRRHOSIS: EXPERIENCE WITH AN UNSELECTED GROUP OF PATIENTS.** *(E.)* Stone, W. D. (Queen Elizabeth Hosp., Birmingham, England), N. R. K. Islam and A. Paton. *Quart. J. Med.* 37(145):119-132, 1968.

The causes and outcome of cirrhosis (excluding cardiac and secondary biliary cirrhosis) are discussed on the basis of experience with 155 unselected patients (91 males and 64 females, average age 58 yr) encountered during the period 1956-64. This represents an incidence of about 0.17% of all hospital admissions (excluding pregnancy). While the etiology was unknown in 48.4%, 33.5% could be ascribed to alcoholism and 10% had a history of jaundice; primary biliary cirrhosis accounted for 5 cases, 4 had hemochromatosis, 1 had Wilson's disease, 2 had sarcoidosis and 1 had schistosomiasis. The presence of cirrhosis was confirmed histologically in 142 cases. Most of both the alcoholic group and the cryptogenic group were diagnosed histologically as having post-hepatitic cirrhosis (57.8% and 74.1%, resp.), nutritional cirrhosis being diagnosed in 28.9% and 11.1%, resp., and obstructive cirrhosis in 10.6% and 5.5%, resp. Males accounted for 80.7% of the alcoholic group and 37.9% of the cryptogenic group. The two groups could not be differentiated on the basis of presenting symptoms or hematological and biochemical findings at admission. Jaundice was present in 31.6% of the entire group, ascites in 32.9%, gastrointestinal hemorrhage in 12.2%, liver failure in 16.1%, leukocytosis in 16.1%, and portal hypertension in about 50% on the basis of esophageal varices. During the course of cirrhosis, there were 31 cases of major gastrointestinal hemorrhage, 27 from varices and 4 from gastric erosion or duodenal ulcer; 19 of these 31 patients died within 1 month and 9 more died subsequently, accounting for 11.4% of the total mortality. Other causes of death were liver failure in 34.2%, hepatoma in 18.4%, and liver failure following acute infections such as pneumonia in 13.2%. Only 14.3% survived for 5 yr or more, the prognosis being especially poor in patients with ascites (5-yr survival of 8.8%). The prognosis was better in the alcoholic group than in the cryptogenic group (5-yr survivals of 20.2% and 5.1%, resp.), due largely to a high early mortality in the latter. Hepatoma developed in 22 patients with cirrhosis, 19 of these being men. It is concluded that the incidence of cirrhosis associated with alcoholism is increasing in the United Kingdom.

2629 **ASPECTS OF IRON METABOLISM IN ALCOHOLIC CIRRHOSIS OF THE LIVER.** *(It.)* Betetto, D. (United Munic. Hosp., Venice, Italy) and P. Cristina. *Clinica* 27(4):288-306, 1968.

Serum Fe levels and urinary Fe excretion before and after the i.m. injection of 1 g of desferrioxamine B methosulfonate (a chelating agent which promotes the urinary excretion of ferric iron) were studied in 20 normal subjects and 27 patients (23 men and 4 women, 34-70 yr old) with alcoholic cirrhosis, including 8 with chronic hepatitis and developing cirrhosis and 19 with typical hepatic cirrhosis (8 of 19 with ascites); 2 of the 27 also had diabetes. Iron was determined colorimetrically by means of o-phenanthroline after combustion of the sample with nitric and sulfuric acids. Liver biopsy was also performed in 14 cases, and in 5 cases the Fe concentration was determined in the ascites fluid. These studies revealed no significant difference in basal urinary iron excretion between normal controls (0.01-0.80, av. 0.36 mg in 6 hr) and patients with cirrhosis (0.06-1.6 av. 0.54 mg/6 hr). After desferrioxamine, however, the urinary excretion in 6 hr was 0.06-26.7 (av. 4.7) mg in patients with cirrhosis and 0.03-2.25 (av. 1.22) mg in controls, while in 24 hr the corresponding values were 1.41-20.5 (av. 4.62) mg and 0.47-2.12 (av. 1.46) mg. Using a urinary Fe excretion of more than 3 mg after desferrioxamine as a criterion, a positive desferrioxamine test was obtained in 12 of the 27 patients (8 of 12 after 6 hr and 4 of 12 after 24 hr); the ratio between Fe excretion after desferrioxamine and normal Fe excretion was >8.0 (another commonly used criterion of hypersiderosis) in only 8 of these patients, so that the absolute excretion is a more reliable diagnostic criterion. Furthermore, since the response was significantly delayed in some cases of alcoholic cirrhosis, the 24-hr excretion is a more reliable index than the 6-hr value. There was no correlation between the response to desferrioxamine and the serum or hepatic iron levels. Hepatic siderosis as revealed histochemically was mild in 4 cases, moderate in 2, severe in 2 and absent in 6, and the desferrioxamine test was positive in only 3 of 8 with hepatic siderosis. The basal serum iron was significantly lower in patients with hepatic cirrhosis (50-164, av. 85 μg%) than in those with chronic hepatitis (60-208, av. 119 μg%) or in normal controls; although 12 patients showed an increase and 15 a decrease 2 hr after desferrioxamine, at 4 hr there was a general decrease of about 35% in the serum Fe. The ascites fluid of 5 patients showed an iron content of 43 μg%, which decreased to an average of 23 μg% 2 hr after desferrioxamine. It is concluded that a positive desferrioxamine test is an early and sensitive indication of an increased tendency to absorb and retain Fe.

2630 ZINC AND MANGANESE LEVELS IN SERUM AND LIVER AFTER ALCOHOL FEEDING AND DEVELOPMENT OF FATTY CIRRHOSIS IN RATS. *(E.)*

Barak, A. J. (VA Hosp., Omaha, Nebr.), H. C. Beckenhauer and F. J. Kerrigan. *Gut* 8(5):454-457, 1967.

In Sprague-Dawley rats fed on a diet of Rockland rat-mouse pellets containing 0.015% Mn and 0.0063% Zn, replacement of drinking water by 15% ethanol for 3 months produced a significant decrease in liver Zn content (to 32.2 μg/g wet weight or 170 μg/g protein compared to 37.8 and 215, resp., in controls) but had no significant effect on serum or liver Mn (slightly increased) and did not impair the ability of the liver to remove added ammonia from the blood or to produce urea nitrogen from added ammonia [studied by the isolated perfused liver technique of Miller et al. (*J. Exp. Med.* 94:431, 1951)]. These livers were normal in appearance and were not fatty. In other rats, fatty cirrhosis was produced by 3 weeks on a choline-deficient diet similar to that of Humoller & Zimmerman (*Amer. J. Physiol.* 177:279, 1954). These rats showed high serum Zn levels, a slight decrease in serum Mn, and a marked decrease in liver Mn (to 1.18 μg/g wet weight or 8.3 μg/g protein compared to 2.3 and 12.7, resp., in controls). The liver Zn content per gram of protein was not significantly affected but that per gram wet weight was decreased to 31.4 μg/g (37.8 in controls). Since Mn activates two important steps in the Krebs-Henseleit urea cycle and Zn activates glutamic acid dehydrogenase which converts α-ketoglutarate to glutamate and plays a role in protein synthesis, it is postulated that dietary choline deficiency and alcohol may independently produce biochemical deficiencies which act synergistically to cause failure of the ammonia detoxification systems and the development of portal cirrhosis.

2631 INDIAN CHILDHOOD CIRRHOSIS: CLINICOPATHOLOGICAL STUDY OF 100 CASES. *(E.)*

Dayal, R. S. (S. N. Med. Coll., Agra, India), G. P. Mathur, R. Prasad and P. N. Wahi. *Indian Pediat.* 5(1):17-23, 1968.

Among 100 clinically established cases of Indian Childhood Cirrhosis (67 males and 33 females, 5 months–6 yr old), 60 of which were confirmed by needle biopsy, 38 had only hepatosplenomegaly, 52 also had ascites, and the 10 most severe cases had hepatosplenomegaly, ascites and jaundice. The principal symptoms were abdominal distension (100 cases), irritability (80), anorexia (78), constipation (37), fever (31), edema (21), and bleeding (5). Anemia was found in 86 cases, including 47 with microcytic hypochromic, 24 with normocytic normochromic, and 15 with normocytic hypochromic anemia. Hypoalbuminemia was found in 96 cases, hyperglobulinemia in 94, and positive liver function tests in 58-62. All 30 infants studied showed an absence of free gastric HCl. A history of gastroenteritis was reported in 85 cases, 63 were breast-fed, and 90 were from vegetarian families. With regard to genetic factors, 33 cases showed a familial incidence and in 15 the disease was reported in previous generations on both sides of the family; only 26 were first children, while 11 were the youngest in large families; one pair of uniovular twins was affected, and in 2 cases the children from the 1st wife were affected while those from the 2nd wife escaped. Liver biopsy showed early cirrhotic changes in 3 cases, characterized by wide-spread liver-cell damage which was not confined to a particular zone of the lobe; the swollen cells showed a granular cytoplasm and large pale nuclei with a definite nuclear membrane to which small chromatin particles were attached. The central position of the nucleolus with rarified surrounding cytoplasm resulted in a "bird's eye" appearance. The 57 cases with advanced cirrhosis showed marked structural changes, scattered liver cells being found in various stages of disintegration within the well-formed pseudolobules. The cytoplasm showed localized areas of hyalinization, and the fibrous tissue bands were densely infiltrated by mononuclear cells. In addition to multivitamins, a high-protein diet and iron, 30 of the children received prednisolone (initially 1 mg/lb in divided doses, decreased to a maintenance dose of 0.5 mg/lb after clinical improvement). Despite improvement in the plasma proteins in 20 of 30 and transitory symptomatic improvement in 25 of 30 after 3-5 days of treatment, prednisolone was judged to have no significant effect on the prognosis. Only one child remains alive, 4 yr after diagnosis; 10 died within the first month, 50 in 1-6 months, and 39 in 6-18 months. In view of the histological findings and the lack of relation to nutritional status, a virus is tentatively held responsible for this form of infantile cirrhosis.

2632 CYTOGENETIC STUDIES IN INFANTILE CIRRHOSIS. *(E.)*

Grover, S. (Med. Coll. Nagpur, India) and B. B. Solanki. *J. Indian Med. Ass.* 50(2):48-52, 1968.

In 10 Indian infants (7 males and 3 females, 6 months–2 yr old) with hepatic cirrhosis (confirmed by biopsy in 6 of 10), cytogenetic studies of bone-marrow smears failed to reveal any abnormalities in the chromosome number or karyotype. Seven of these infants were from low-income families and only one had a sibling who had died of cirrhosis. Contrary to previous reports in the literature, which indicate that cirrhosis is usually accompanied by hypochromic normocytic anemia, a megaloblastic bone marrow was found in 6 of the 10 cases. In these same 6 marrows, the chromosomes were elongated, poorly separated and fuzzy, with spreading of the centromeres. Chromatid breaks and heterochromatin were also prominent, but these alterations are ascribed to the megaloblastic hematopoiesis rather than to any underlying genetic abnormality. Further detailed studies of the types of anemia found in infantile cirrhosis is suggested to determine the presence of inherent metabolic defects.

2633 **A STUDY OF 100 CASES OF CIRRHOSIS IN BRUSSELS. I. SOCIOLOGICAL ASPECTS.** *(Fr.)* Heimann, R. (Dept. Pathol. Anat., J. Bordet Inst., Brussels, Belgium) and D. Ardichvili. *Acta Gastroent. Belg.* 31(2):107-111, 1968.

Among 100 cases of hepatic cirrhosis which came to autopsy at the St. Gilles Hospital in Brussels between 1949 and 1963, representing 5.6% of the 1775 autopsies done in that period, the age and sex distribution (54 men and 46 women, mean age 67.5 yr) was about the same as that in the whole autopsied population (50.6% males, mean age 69.5 yr). Only 40 of these 100 cases were alcoholics (24 men and 16 women), beer being the most common beverage consumed, and 14 of these were occupational (waiters, bartenders, brewery workers, etc.). However, the mean age of the alcoholics was only 62 yr, with 23 of 40 below the age of 65, compared to 71 yr in the other 60 cases (10 of 60 below 65 yr). A history of jaundice was noted in the case histories of 18 patients.

2634 **A STUDY OF 100 CASES OF CIRRHOSIS IN BRUSSELS. II. MORPHOLOGICAL STUDY AND DISCUSSION OF THE VALIDITY OF THE HISTOLOGICAL CLASSIFICATION OF CIRRHOSIS.** *(Fr.)* Ardichvili, D. (Dept. Pathol. Anat., J. Bordet Inst., Brussels, Belgium) and R. Heimann. *Acta Gastroent. Belg.* 31(2):112-125, 1968.

Among the same 100 autopsy cases of hepatic cirrhosis discussed in the previous paper, 19 were classified histologically as portal cirrhosis, 62 were post-necrotic or post-hepatic cirrhosis, 7 had secondary biliary cirrhosis, 1 had pigmentary cirrhosis, 1 had cardiac sclerosis, and 10 could not be classified. There were 17 cases of hepatoma, 14 complicating post-necrotic cirrhosis and 3 with portal cirrhosis. The mean age of portal cirrhosis patients at death was only 59 yr compared to 67.5 yr for the entire group. Among the 40 alcoholics, 17 had portal cirrhosis, 17 post-necrotic cirrhosis, and 6 cirrhosis of other types, confirming the association between alcoholism and portal cirrhosis. Since the agreement between different pathologists was 70% on the initial reading of the slides, and 95% on a 2nd reading when the macroscopic findings in the biliary tract were also considered, the classification of Gall (*Amer. J. Path.* 36: 241, 1960) is concluded to be a valid and reproducible system for the histological classification of cirrhosis. Illustrations of the various histological types are presented. In the discussion, J. Pirard reported briefly on the results of a study of cardiovascular disease among 83 diabetic and 64 nondiabetic cirrhotics, 64% of whom were alcoholics and 9% of whom had a history of hepatitis; macroscopically, 55% had small nodules on the liver and 30% had large nodules, while microscopically, 45% were diagnosed as Laennec's cirrhosis and 45% as post-necrotic cirrhosis.

2635 **EVALUATION OF A SIMPLE SCORING TECHNIQUE IN THE DIAGNOSIS OF INDIAN CHILDHOOD CIRRHOSIS.** *(E.)* Sharma, S. K. (Govt. Med. Coll., Jabalpur, Madras, India), S. Agarwal and K. K. Kaul. *Indian Pediat.* 5(1):24-28, 1968.

A scoring system based on age, sex, membership of the parents in a known susceptible community or socioeconomic class, family history of the disease, and consistency of the enlarged liver was proposed and an attempt was made to correlate this "liver score" with the biopsy diagnosis of cirrhosis in 155 selected Indian children: 80 with established Indian Childhood Cirrhosis, 25 labeled as "early childhood cirrhosis" due to a biopsy picture of nonspecific reactive hepatitis in the absence of other known causes, and 50 with a positive liver biopsy and hepatomegaly associated with some accountable clinical disorder. In the scoring system, 1 point is given for age between 1 and 3 yr, for liver size >3 cm, for an annual income between 100 and 300 Rs/yr, for a liver consistency of "firm grade I," if the patient is the 1st male child, if a 1st cousin died of cirrhosis, and if the family is a member of a moderately susceptible group; 2 points are given for a liver consistency of "firm grade II," if a sibling died of cirrhosis, and for membership in the Baniya, Agrawal, Jain, or vegetarian Brahmin communities which are known to be highly susceptible to cirrhosis. The maximum possible score is 10. The mean score obtained was 6.5 (range 5-9) in the group with established Indian Childhood Cirrhosis, 6.2 (5-8) in those with "early childhood cirrhosis." and 3.1 (1-6) in the 50 others. Associated conditions in this latter group included various infections (22), malnutrition (18), anemia (6), Down's syndrome (3), post-hepatic cirrhosis (2), acyanotic congenital heart disease (2), galactosemia (1) and rickets (1). It is concluded that a score of over 6 in a child presenting with hepatomegaly unassociated with any clinical disorder should be diagnosed as Indian Childhood Cirrhosis regardless of the liver biopsy. Children scoring 5 or 6 should be considered "high-risk" and followed closely.

2636 **UTILIZATION OF LIPIDS BY THE CIRRHOTIC AS A FUNCTION OF FATTY ACID CHAIN LENGTH.** *(Fr.)* Warter, J. (Clin. Hosp., U. Strasbourg, France), P. Metais and A. Bach. *Arch. Mal. Appar. Dig.* 57(2) (Suppl. 1):98, 1968.

The variations in blood lipids were followed for 10 hours in cirrhotic patients after the ingestion of 100 g fat for the determination of chylomicrons (insoluble triglycerides), the enzymatic level of serum triglycerides and the nonesterified fatty acids. After the ingestion of long chain fatty acids, there is a diminution and delay in the rise in the hyperlipemia often seen in the cirrhotic, in correlation with the severity of the hepatic damage. The curve of variation of serum nonesterified fatty acids in the cirrhotic is quite different from that of normal subjects. In the early stages of the illness, the elevation is often early, but in the terminal stages of decompensated cirrhosis, the increase in nonesterified fatty acids is less intense and indicates the lowered absorption of these fats. These results demonstrate that the medium and short fatty acids are transported and metabolized by other pathways than are the long chain fatty acids. The test methods are considered inadequate for accurate determination of the metabolic pathway of these long chain fatty acids.

2637 **SURGICAL EXCLUSION OF THE COLON FOR CHRONIC HEPATIC ENCEPHALOPATHY.** *(E.)* Dudrick, S. J. (Dept. Surg. Res., U. Pennsylvania, Philadelphia), J. A. Mackie and O. Serlin. *Amer. J. Surg.* 115(1):57-62, 1968.

Patients with hepatic encephalopathy have not responded well to conventional medical therapy to reduce the formation of ammonia and other toxic nitrogenous substances in the bowel. Consequently a report is made of successful treatment of a patient and follow-up data on 2 previously reported cases of ileocolic surgery for exclusion of the colon in reversing the course of chronic refractory hepatic encephalopathy. A cecorectosigmoid anastomosis was carried out on a Caucasian male (46 yr) and previously on 2 Caucasian males (45 yr and 63 yr). A review of literature is given.

2638 CARDIORESPIRATORY DETERMINANTS OF SURVIVAL IN CIRRHOTIC PATIENTS REQUIRING SURGERY FOR PORTAL HYPERTENSION. *(E.)* Greenspan, M. (Albert Einstein Coll. Med., Bronx, N. Y.) and L. R. M. Del Guercio. *Amer. J. Surg.* 115(1):43-56, 1968.

A retrospective study was conducted to analyze the hemodynamic factors, such as venoarterial admixture and hyperdynamic cardiovascular state, affecting mortality after elective surgery or emergency surgery for hemorrhage in patients with portal hypertension. From Dec. 1961 through May 1966, 47 patients with cirrhosis who required surgery were studied with mobile cardiac catheterization equipment. Data are tabulated for hemodynamic and respiratory parameters, listing preoperative values, 3 sets of values during operation and at extubation, and for 7 days postoperative, for the following parameters: cardiac index, stroke index, central blood volume, total peripheral resistance, blood pressure, central venous pressure, mean ejection rate, stroke work, buffer base, arterial and venous pH, pO_2, pCO_2, oxygen consumption, effective oxygen transport, and venoarterial admixture (% of cardiac output). Morbidity increases with systemic and pulmonary shunting, a low ventricular reserve (ability to withstand hyperdynamic cardiovascular state), development of metabolic alkalosis, variceal hemorrhage, and hypoxia. Retrospective analysis of portacaval shunt *vs.* splenorenal shunt shows no postoperative hemodynamic difference in a small series of patients.

2639 EDITORIAL: GEOGRAPHIC CONSIDERATIONS IN CIRRHOSIS. *(E.)* Richman, A. *Amer. J. Gastroent.* 49(3):263-264, 1968.

2640 RUPTURED MESENTERIC VARIX IN CIRRHOSIS – UNUSUAL CAUSE FOR HEMOPERITONEUM. *(E.)* Rothschild, J. J. (Kimbrough Army Hosp., Ft. Meade, Md.), I. Gelernt and W. Sloan. *New Eng. J. Med.* 278(2):97-98, 1968.

2641 THE PATHOGENESIS OF CIRRHOSIS OF THE LIVER IN THE MIDDLE EAST (A STUDY OF 210 CASES). *(E.)* Munzer, D. (Damascus Hosp., Syria). *Amer. J. Gastroent.* 49(3):241-250, 1968.

2642 TYPE OF CIRRHOSIS AS AN AETIOLOGICAL AGENT IN PRIMARY CARCINOMA OF LIVER. *(E.)* Rao, K. S. (Andhra Med. Coll., Visakhapatnam, India) and R. D. Sharma. *Indian J. Path. Bact.* 11(1):8-12, 1968.

2643 HEMODYNAMICS OF THE SPLEEN IN BANTI'S SYNDROME. *(E.)* Koyama, K. (Tohoku U. Sch. Med., Sendai, Japan). *Tohoku J. Exp. Med.* 93(3): 199-217, 1967.

2644 PARTIAL NODULAR TRANSFORMATION OF THE LIVER WITH PORTAL HYPERTENSION. [CASE REPORT] *(Fr.)* Maillard, J. N. (Beaujon Hosp., Clichy, France), F. Potet and J. P. Benhamou. *Presse Med.* 75(54):2799-2802, 1967.

2645 INTERNATIONAL SYMPOSIUM ON PORTAL HYPERTENSION, BAD-RAGAZ, OCTOBER 29-31, 1967. *(Fr.)* Leger, L. *Presse Med.* 75(51):2631-2632, 1967.

2646 JOINT SYMPOSIUM OF THE MEDICAL SOCIETY OF THE PARIS HOSPITALS AND THE FRENCH NATIONAL SOCIETY FOR GASTROENTEROLOGY ON NOVEMBER 3, 1967 ON THE LONG-TERM RESULTS OF PORTACAVAL SHUNT. *(Fr.)* Dayras, J. C. *Presse Med.* 75(48):2478, 1967.

2647 SOME IMMUNOLOGICAL INDICATORS IN LIVER CIRRHOSIS PATIENTS. *(Rus.)* Bondar, Z. A. (I. M. Sechenov 1st Moscow Med. Inst., USSR), L. G. Finogenova and R. P. Zolotnitskaia. *Sovet. Med.* (3):15-21, 1968.

2648 PRIMARY BILIARY LIVER CIRRHOSIS AND POSTNECROTIC LIVER CIRRHOSIS WITH CHOLESTASIS. *(Rus.)* Loginov, A. S. (A. M. Miasnikov Inst. Ther. Acad. Med. Sci. USSR, Moscow) and A. M. Yartseva. *Sovet. Med.* (3):21-27, 1968.

2649 RAPIDLY CIRRHOTIC HEPATO-BILIARY TUBERCULOSIS. DATA ON DEVELOPMENT FOR BIOPSY AND AUTOPSY EXAMINATION. *(Fr.)* Weill-Bousson, M. and J. Arbogast. *Arch. Anat. Path. (Paris)* 15(4):288-294, 1967.

2650 CHANGES IN DIURNAL UROBILINURIA IN LIVER CIRRHOSIS AND THE PORTAL HYPERTENSION SYNDROME. *(Rus.)* Simonov, V. V. (S. M. Kirov Mil. Med. Acad., Leningrad, USSR). *Klin. Med. (Moskva)* 46(5):68-71, 1968.

2651 LIVER SCINTIGRAPHY IN CIRRHOSIS PATIENTS. *(Ser.)* Antich, M. (Intern. Med. Clin., Acad. Med., Belgrade, Yugoslavia) and M. Kushich. *Med. Pregl.* 20(9/10):373-378, 1967.

2652 IMMUNOSUPPRESSIVE THERAPEUTIC ATTEMPTS IN THE COURSE OF ETHYL ALCOHO CIRRHOSIS. *(Fr.)* Lamotte, M. (Fac. Med. Paris, France), J. M. Segrestaa and C. Caulin. *Sem. Ther.* 44(4):219-220, 196

2653 TREATMENT OF HEPATIC CIRRHOSIS IN THE ADULT. ETIOPATHOGENIC BASIS, SYMPTOMATOLOGY, AND CLINICAL DIAGNOSIS. EXPERIENCE OF THE DEPARTMENT. *(Sp.)* Dameno, E. (Clin. Hosp., Buenos Aires, Argentina). *Prensa Med. Argent.* 55(3):121-129, 1968.

2654 ETIOLOGY AND PATHOGENESIS OF LIVER CIRRHOSIS. *(Ger.)* Thaler, H. (Wilhelm Hosp., Vienna, Austria). *Deutsch. Med. J.* 19(10):369-375, 1968.

2655 **CHANGES IN INTESTINAL PHOSPHATASE IN CIRRHOSIS: THEORIES ON BLOOD RETENTION.** *(Fr.)* Delcourt, R. (Charleroi, Belgium). *Acta Gastroent. Belg.* 31(1):18-27, 1968.

2656 **HEPATIC SINUSOIDAL CELLS IN NORMAL RAT LIVER AND IN LIVER FROM RATS WITH EXPERIMENTAL CIRRHOSIS.** *(Rus.)* Kostyrev, O. A. and G. I. Borisova. *Arkh. Pat.* 30(1):27-32, 1968.

2657 **CYTOGENETIC STUDIES IN INFANTILE CIRRHOSIS.** *(E.)* Grover, S. and B. B. Solanki. *J. Indian Med. Ass.* 50(2):45-48, 1968.

2658 **RENAL FAILURE IN CIRRHOSIS–ROLE OF PLASMA VOLUME.** *(E.)* Papper, S. and C. A. Vaamonde. *Ann. Intern. Med.* 68(4):958, 1968.

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2659 AGENESIS OF THE GALLBLADDER. *(E.)* Frey, C. (U. Michigan Med. Ctr., Ann Arbor), L. Bizer and C. Ernst. *Amer. J. Surg.* 114(6):917-926, 1967.

A detailed review of the English literature on agenesis of the gallbladder revealed 56 proven cases reported by 37 authors; in 13 of these patients agenesis was confirmed at operation and in 43 it was confirmed at autopsy. The principal signs and symptoms and the prognosis of agenesis of the gallbladder are discussed on the basis of these cases and four patients observed in Ann Arbor during the period 1960-65 (one confirmed at autopsy and 3 at operation). The review of the literature also revealed 25 cases from 23 reports which are classified as "probable" rather than proven due either to inadequate dissection at operation (12 cases) or the absence of a T-tube cholangiogram (13 cases). Furthermore, 27 reports are cited as listing a total of 45 "possible" cases, for which insufficient evidence was presented in the reports. Finally, 15 other articles are cited which described 16 "questionable" cases of agenesis of the gallbladder, in which the findings are open to several interpretations. It is pointed out that agenesis of the gallbladder can result either from failure of its bud to proliferate or from failure of the partially formed gallbladder to recanalize. However, true agenesis must be carefully distinguished from ectopic location or necrosis of the gallbladder following inflammatory disease. Although common duct dilatation and stones have been reported as associated with agenesis of the gallbladder, their pathogenesis remains unclear.

2660 BACTERIOLOGICAL STUDIES ON GALLSTONES. *(E.)* Gupta, S. (Coll. Med. Sci., Banaras Hindu U., India), K. N. Udupa and Shrinivas. *Indian J. Path. Bact.* 11(1):43-52, 1968.

Bacteriological studies on gallstones (25 "mixed," 9 "cholesterol" and 2 "pigment" stones) and bile from 36 patients operated on for cholelithiasis in 1963-65 revealed 25 samples of bile and 21 gallstones (18 "mixed" and 3 "cholesterol" stones) which yielded positive cultures. In 8 cases, both the bile and the stone were sterile, while in 3 cases only the bile was sterile and in 7 cases only the stone was sterile. The 15 sterile stones included 7 "mixed," 6 "cholesterol" and 2 "pigment" stones. In 12 cases the same organisms were grown from the bile and the stone, while in 6 cases different organisms were isolated. The most commonly found organisms were *Escherichia coli* (from 6 stones and 5 samples of bile), *Klebsiella pneumoniae, Bacillus subtilis* and *Salmonella typhi*, followed by staphylococci and streptococci. It is concluded that infection plays an important role in the etiology of cholelithiasis.

2661 THE PHYSICOCHEMICAL BASIS OF CHOLESTEROL GALLSTONE FORMATION IN MAN. *(E.)* Admirand, W. H. (Boston U. Med. Sch., Mass.) and D. M. Small. *J. Clin. Invest.* 47(5):1043-1052, 1968.

Determinations of the concentrations of bile salt, lecithin and cholesterol in each of 25 samples of normal human gallbladder bile (from 22 men and 3 women) and 66 samples of gallbladder bile from patients with cholesterol gallstones (59 men and 7 women) revealed only inconsistent differences when the concentrations were expressed in terms of millimoles/liter, but a clear separation between the normal and "abnormal" biles when the concentration of each component was expressed as the percent of total millimoles (or plotted simultaneously on triangular coordinates). The relative concentration of bile salt was fairly constant (70.6-76.2%), but the lecithin content was decreased in abnormal bile (13.0-14.2% compared to 20.4% in controls) and the cholesterol content was markedly increased (from 6.0% in normal bile to 9.6% in bile from gallstone patients which did not contain microcrystals of cholesterol and 16.4% in abnormal bile which did contain such microcrystals). To determine whether the basis of this separation between normal and abnormal biles was related to the limits of cholesterol solubility in pure lecithin and bile-salt solutions (or mixed micelles of bile salt and lecithin), a model system was constructed in which varying amounts of taurine and glycine conjugated bile salts, lecithin and cholesterol were mixed with water at a constant total solids concentration of 5, 10 or 20%. Plotting of this data on triangular coordinates resulted in a phase diagram which predicts the physical state of all possible combinations of bile salt, lecithin and cholesterol in aqueous solutions containing a total of 10% (or 5 or 20%) solids. When the data on human bile were compared with the solubility of cholesterol as derived from the model system, all the normal biles were found to be less than saturated with cholesterol, while biles from patients with cholesterol gallstones were either at the borderline of saturation or supersaturated with cholesterol (the latter in the case of biles containing cholesterol microcrystals). Since the model system was able to predict actual data despite the absence of other normal biliary constituents such as bilirubin, protein and inorganic ions, it is proposed that the physical state of bile is determined solely by the relative concentrations of bile salt, lecithin and cholesterol. It is emphasized, however, that this study dealt only with the first step in gallstone formation, i.e., the conditions that bring about the precipitation of cholesterol in bile, and not with the factors which may affect the growth or accretion of cholesterol microcrystals.

2662 THE COMPOSITION OF HUMAN GALLSTONES. *(E.)* Russell, I. S. (Roy. Melbourne Hosp., Australia), M. B. Wheeler and R. Freake. *Brit. J. Surg.* 55(3):161-168, 1968.

Analysis of gallstones obtained from 100 human gallbladders at operation, using biochemical, histochemical and infra-red spectrographic techniques, revealed that the traditional classification into "cholesterol," "pigment" and "mixed" stones does not withstand critical analysis. Rather than having one dominant substance in their centers, all the stones contained mixtures of cholesterol and pigment, usually plus protein. Biochemical analysis revealed the presence of cholesterol in 62 of 67 "mixed" stones and 3 of 15 "pigment" stones, as well as in cholesterol stones. Pigment was found in only 13 of 15 "pigment" stones, as well as 13 of 14 "cholesterol" stones and 63 of 67 "mixed" stones. Calcium was present in 4 "cholesterol" stones, 13 "mixed" stones and 9 "pigment" stones, and protein was present in 5, 23 and 11 of the stones, resp. Even when only the centers of the stones were analyzed, protein and/or pigment was found in 5 of 8 "cholesterol" stones, lcium was found in 4 of 8, and only 4 of the centers con- ined cholesterol. The centers of "pigment" stones all con- ined both cholesterol and pigment, and 12 of 17 also had otein. These results were confirmed by infra-red spectro- opy of 72 stones, which generally yielded mixed absorption ectra, although the spectra of the 7 "pigment" stones analyzed ere very similar to the spectrum of pure bilirubin. Periodic id Schiff and Alcian Blue staining of the cut surfaces of 100 ones also revealed pigment in the centers of almost all, even so-called pure cholesterol stones. It is concluded that gall- ones with different superficial characteristics simply represent fferent combinations of the same basic ingredients and that ey probably all have the same basic etiology.

563 GALLBLADDER FUNCTION IN THE DOG FOLLOWING SUBTOTAL GASTRIC RESEC- ION OR VAGOTOMY AND PYLOROPLASTY. *(E.)* Loeb, . (VA Hosp., Minnespolis, Minn.) and D. M. Nicoloff. *Surgery* 3(5):806-809, 1968.

uman gallstones from a single patient were dried to constant eight and inserted into the gallbladders of 30 mongrel dogs, 5 of which had been subjected to gastric surgery (70% gas- ectomy with Billroth I end-to-end gastroduodenostomy or llroth II gastrojejunostomy, 3-6 weeks before, total anterior d posterior vagotomy and Heineke-Mikulicz pyloroplasty 3-6 eeks before, or vagotomy and pyloroplasty immediately before nplantation of the stones). The rate of dissolution of the gall- ones were not significantly affected by gastric surgery. The nount of the gallstone found to be dissolved when the dogs ere sacrificed 4 weeks later varied from 40-100%, but the erage values were not significantly different in controls (68%) d those subjected to surgery (69-76%). It is concluded that e vagus apparently plays no significant role in the dynamics bile flow. These experiments provide no basis for an in- eased incidence of cholelithiasis after surgery for peptic ulcer man.

564 PARTIAL BILIARY OBSTRUCTION WITH CHOLANGITIS PRODUCING A BLIND LOOP YNDROME. *(E.)* Scott, A. J. (Roy. Free Hosp., London, ngland) and G. A. Khan. *Gut* 9(2):187-192, 1968.

mong 11 patients with partial biliary obstruction and chol- gitis due to choledocholithiasis (5 cases), previous chole- ystoduodenostomy (1 case), or strictures following hepato- chojejunostomy and enteroanastomosis (5 cases), all of whom ere jaundiced and only 2 of whom had received antibiotic erapy, the concentration of viable bacteria in the bile and nall intestinal contents was in the range found in patients ith the blind loop syndrome (100,000-7,000,000,000 per ml). ne bile contained *Escherichia coli* in 9 cases, *Klebsiella rogenes* in 6, *Streptococcus faecalis* in 4, *Proteus vulgaris* in and *Pseudomonas aeruginosa* in 2. The 24-hr urinary indican xcretion in 8 of the 9 patients with biliary *E. coli* was higher an in any normal subjects or control patients with cryptogenic primary biliary cirrhosis or obstructive jaundice due to pan- eatic cancer. Unconjugated bile acids were present in the bile 6 of 11 patients, but not in the sterile bile from 19 control bjects with pancreatic or biliary cancer. Vitamin B$_{12}$ absorp- on as measured by the Schilling test was subnormal in 7 of 9 ses initially, and was normalized by tetracycline therapy in all cases tested. It is concluded that biliary obstruction and cholangitis result in significant bacterial contamination of the small intestine and abnormalities in tryptophan metabolism, bile acid metabolism and vitamin B$_{12}$ absorption which parallel those seen in the blind loop syndrome.

2665 PRIMARY MALIGNANT TUMORS OF THE BILE DUCTS AT THE HILAR LEVEL. *(It.)* Scarabelli, L. (Inst. Gen. Clin. Surg., U. Pavia, Italy), P. Colombo and E. Mantellini. *Minerva Chir.* 23(8):387-401, 1968.

The incidence, etiology, pathological anatomy, symptoms, diagnosis and treatment of malignant tumors of the extrahepatic bile ducts are discussed on the basis of a detailed review of the literature (35 references) and 2 personal cases (males, 25 and 64 yr old) with scirrhous carcinoma of the proximal extrahepatic ducts. The 1st patient, with a history of variable epigastric pain and weight loss of about 6 months and jaundice for 3 months, was treated by hepatic lobectomy and hepatico-duodenostomy; although discharged as improved in 1.5 months, the patient died 3 months later in hepatic coma. The 2nd patient showed a similar course and died in hepatic coma about 2 months after cholecystectomy, excision of the hepatic-duct tumor, and hepatico-duodenostomy. Emphasis is placed on the variability of the development of these tumors, which can be characterized either by early metastasis or by slow growth and insidious symptomatology with a tendency to remain localized. The differential diagnosis of the jaundice produced by this type of biliary obstruction is discussed and attention is given to those findings which may facilitate distinguishing between sclerotic cholangitis and scirrhous carcinoma. Although radical surgery is sometimes possible, favorable attention is also given to the palliative treatment of these tumors by means of bilio-digestive anastomoses. Following proper preparation of the hepatic hilar plaque, an anastomosis can be created between the intrahepatic bile ducts and either the duodenum or (preferably) a defunctionalized loop of ileum. In most cases, however, the prognosis is poor.

2666 STUDIES ON THE FAMILIAL INCIDENCE AND CLINICAL HISTORY OF PATIENTS WITH CHRONIC UNCONJUGATED HYPERBILIRUBINAEMIA. *(E.)* Smith, P. M. (King's Coll. Hosp., London, England), J. E. Middleton and R. Williams. *Gut* 8(5):449-453, 1967.

Among 11 patients (9 males and 2 females, 14-48 yr old) with idiopathic chronic unconjugated hyperbilirubinemia (serum total bilirubin = 1.2-15.7 mg%) of some 1-44 yr duration, both the degree and duration of jaundice varied widely. Based on the degree of jaundice and the findings among 27 close relatives, the 11 patients could be divided into 3 groups: 2 patients with a serum total bilirubin of 6.6 and 15.7 mg%, but no other symptoms, and definite evidence of hereditary involvement; 4 patients with a serum total bilirubin of 2.5-4.2 mg% and a pattern of dominant genetic transmission; and 5 patients with jaundice of later onset (at the age of 19-43 yr compared to onset at birth or in the teens), lower serum bilirubin levels (1.2-2.2 mg%), additional gastrointestinal symptoms, and no involvement of the relatives. Liver function tests, liver biopsy (done in 9 of 11) and erythropoiesis were normal in all cases. Several patients in the 2nd and 3rd groups complained of nausea, vomiting and abdominal pain at the onset of jaundice, but in no case were the findings typical of viral hepatitis. Menthol excretion, studied in only 4 cases, was normal in one member each of the 1st and 3rd groups and reduced in one member of the 1st and 2nd groups. The findings in the family of one patient in the 1st group suggested that he was homozygous for the causative gene, since both parents and the 2 siblings examined all showed mild involvement. It is suggested that the jaundice may have been due to acquired causes in the 3rd group, while probably being of familial origin in the others.

2667 **BILE PERITONITIS IN GERM-FREE DOGS.** *(E.)* Cain, J. L. (Louisiana State U. Sch. Med., New Orleans), J. A. Labat and I. Cohn, Jr. *Gastroenterology* 53(4):600-603, 1967.

Bile peritonitis was produced by means of an internally draining gallbladder fistula in 11 conventional and 8 gnotobiotic (4 germ-free and 4 contaminated) dogs; procaine penicillin (800,000 U i.m.) was given to 2 conventional and 2 contaminated gnotobiotic dogs at operation, even though bacteriological studies at the time of operation showed the bile to be sterile in all cases and the peritoneal cavity to be free of bacteria in 6 of 10 conventional animals. All the untreated conventional and contaminated gnotobiotic dogs died within 30 hr, while the 4 treated dogs survived to sacrifice at 5 days. Germ-free dogs did not die of bile peritonitis, even when 1000-2500 ml of bile ascites was present in the peritoneal cavity; reexploration at 15 days confirmed the patency of the gallbladder fistula and the sterility of the peritoneal cavity. Autopsy revealed a sterile peritoneal cavity in one of the dogs which died, but increased numbers of *Staphylococcus albus* and *Clostridium* sp. in the others. Since preoperative duodenal washings revealed *Clostridium* sp. in many cases, this suggests the duodenum as the source of bacteria. It is concluded that bacteria play a major role in the fatal outcome of bile peritonitis, although the source of bacteria in the peritoneal cavity of animals dying of bile peritonitis remains unknown.

2668 **THE FATE OF THE COMMON BILE DUCT AFTER CHOLECYSTECTOMY. I. LONG-TERM FUNCTIONAL RESULTS. REVIEW OF 1892 CHOLECYSTECTOMIES PERFORMED FOR LITHIASIS IN 1942-64.** *(Fr.)* Mallet-Guy, P. (Sch. Med., Lyon, France), J. Murat and D. Bouillet. *Lyon Chir.* 64(2):184-192, 1968.

Among 1892 patients subjected to cholecystectomy for simple cholelithiasis (862), mucocele (52), acute cholecystitis (343) or chronic cholecystitis (635) during the period 1942-64, 575 were found by peroperative manometric and radiographic studies to have associated diseases which could have been responsible for a "post-cholecystectomy" syndrome. These patients, including 166 with choledocholithiasis, 214 with hypotension of the sphincter of Oddi, 109 with sclerosis or hypertension of the sphincter, 67 with chronic pancreatitis and 19 with combined pathology, were therefore excluded from the present study. Of the remaining 1317, 15 died shortly postoperatively and 289 were lost to follow-up, leaving 1013 who were followed for periods up to 24 yr (821 followed for >1 yr). Among these 1013, 76% (75.23-86.11% of the various groups treated for lithiasis or cholecystitis) were completely cured without any dietary restrictions and another 18% continued with mild dietary restrictions (mostly self-imposed out of fear of recurrence). Among this total of 94% with good results, there were, however, some patients who had developed unrelated gastrointestinal disorders, such as constipation (45 cases), colitis (20), subcostal pain probably of rheumatic origin (12), hiatus hernia (5), cancer (7) and gastric ulcer (7). Another 5.8% required a strict diet to avoid recurrence of pain, and there were 2 failures (0.2%): a 66-yr-old woman who developed severe dyspepsia due to hypotension of the sphincter of Oddi 11 months after cholecystectomy, and who was completely cured by right splanchnicectomy, and a 52-yr-old man with hypertension of the sphincter who developed secondary choledocholithiasis 11.5 yr after cholecystectomy; the 2nd patient was treated successfully by choledochoduodenostomy. It is concluded that cholecystectomy *per se* does not disturb the function of the biliary tract and is not responsible for the so-called post-cholecystectomy syndrome.

2669 **THE ROLE OF GASTRIC JUICE IN THE PATHOGENESIS OF ACUTE CHOLECYSTITIS: AN EXPERIMENTAL STUDY.** *(E.)* Prakash, A. (All-India Inst. Med. Sci., New Delhi, India), P. R. Patra and D. K. Verma. *Indian J. Med. Res.* 56(3):355-361, 1968.

In experiments on adult mongrel dogs of both sexes, sacrificed 2-5 days after the beginning of the experiment, introduction of canine gastric juice (pH 3.5-5.0) into the gallbladder lumen resulted in moderate-severe cholecystitis in 6 of 12 dogs, but no perforation of the gallbladder. One of 13 original dogs died. At sacrifice, all the others showed congestion of the gallbladder wall, and 11 of 12 showed local peritonitis and loss of translucency. Although the mucosa remained more or less normal in most, the lamina propria was infiltrated in all 12. When introduction of gastric juice was combined with cystic duct ligation, 4 of 16 dogs died, 10 of the 12 survivors developed moderate-severe cholecystitis, and 2 of 10 developed perforation of the gallbladder. All had local peritonitis and 3 of 12 had generalized peritonitis when sacrificed. The gallbladders were distended, opaque, congested and covered with fibrin flakes. In most, the contents of the gallbladder were mucopurulent. The serosa, muscle coat and lamina propria were heavily infiltrated with inflammatory cells, and 2 of 12 dogs showed gas within the gallbladder. In controls, saline alone produced mild inflammation in 3 of 10 dogs but no moderate or severe reactions. Cystic duct ligation plus introduction of saline produced thickening of the bladder wall and mild gross congestion in most, but no peritonitis. The mucosal lining remained intact in all, but 6 of 12 dogs showed scattered infiltration of the muscle, 7 of 12 had serosal edema, and 3 of 12 developed lymphocytic infiltration of the lamina propria. It is postulated that reflux of gastric juice from the duodenum into the biliary tract may play a role in the pathogenesis of acute cholecystitis.

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2673 AGE CHANGES IN LIPID METABOLISM INDICES IN LIVER CIRRHOSIS PATIENTS. *(Rus.)* Iutanova, I. I. (Inst. Ther. Acad. Med. Sci. USSR, Moscow) and A. S. Loginov. *Klin. Med.* 46(3):37-40, 1968.

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2682 SPONTANEOUS EXTERNAL FISTULA OF THE BILE TRACT. *(Ger.)* Paulisch, G. (Municipal Hosp. Moabit, Berlin, Germany). *Zbl. Chir.* 93(1):28-32, 1968.

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Starting with Volume 3, Number 1, the SUBJECT and AUTHOR INDEXES have been generated directly from computer-stored files. The Indexes to prior volumes were manually prepared.

The Subject Index uses a system of permuted *major class* terms combined with SEE and SEE ALSO references. A *major class* term is one embracing a broad concept which can be broken down into *minor class* terms.

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BENIGN GASTROINTESTINAL NEOPLASMS

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02320* 02343 02358 02384* 02388* 02390*
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01781 01784 01787 01924* 02045* 02046* 02057* 02059
02078 02090 02196*
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02415
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02022 02037 02038
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01969 02008* 02035 02042 02113
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02685
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ABSTRACTS AND CITATIONS

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APRIL 1968
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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available, free to qualified interested investigators and practitioners, citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology has accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis and Metabolic Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

GASTROENTEROLOGY ABSTRACTS and CITATIONS is published monthly and includes citations and abstracts from the biomedical world literature as they are currently received. In addition, yearly cumulated subject and author indexes are published. Requests from qualified individuals to receive free copies of this publication, and address changes and other communications from these individuals should be addressed to:

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus.* For journals not covered by *Index Medicus,* the abbreviations (with some modifications) found in *World Medical Periodicals,* 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	mC, μC	milli-, microcurie(s)
ADP	adenosine diphosphate	mg	milligram(s)
AMP	adenosine monophosphate	min	minute(s)
ATP	adenosine triphosphate	ml	milliliter(s)
BSP	sulfobromophthalein	mm	millimeter(s)
C	degrees centigrade	MTD	maximum tolerated dose
cm	centimeter(s)	ng	nanogram (10^{-9})
CNS	central nervous system	pg	picogram (10^{-12})
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	ppm	parts per million
e.g.	for example	r	Roentgen
g	gram(s)	RBC	red blood cells (erythrocytes), red blood count
μg	microgram(s)		
hr	hour(s)	resp.	respectively
i.m.	intramuscular	Rev.	review (only in citations)
i.p.	intraperitoneal	RNA	ribonucleic acid
IU	international unit(s)	s.c.	subcutaneous
i.v.	intravenous	sec	second(s)
kg	kilogram(s)	SGOT	serum glutamic-oxalacetic transaminase
LD$_{50}$	median lethal dose(s)	SGPT	serum glutamic-pyruvic transaminase
LDH	lactic acid dehydrogenase	U	unit(s)
m	meter(s)	UV	ultraviolet
M	molar	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mM	millimolar	yr	year(s)
μM	micromolar		

SPECIAL NOTICE

The fourth issue of Gastroenterology Abstracts and Citations, dated April 1968 (but with the parenthetical statement that it was published in September 1968), contains current coverage of the literature.

Due to circumstances beyond our control a lapse in publication of several months occurred early this year. Every effort is being made to again have the dated issues appear currently by the end of 1969. We trust that the publication will continue to be a useful tool for the gastroenterologists and that the discrepancy between the date on the publication and its later appearance will not be too troublesome.

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PRE-CLINICAL SCIENCES
GENERAL

2697 AUTOMATIC TITRATION OF THE PROTEOLYTIC ACTIVITY OF THE GASTRIC JUICE.

(Fr.) Vatier, J. (Bichat Hosp., Paris, France), A. M. Cheret and S. Bonfils. *Arch. Mal. Appar. Dig.* (Suppl. 1):15-29, 1968.

Parallel determinations of pepsin activity in more than 1300 samples of gastric juice from 100 subjects revealed a correlation coefficient of 0.864 between the results obtained by the manual method of Anson (as modified by Hunt) and those obtained automatically with the Technicon Auto-Analyzer, although the latter were generally higher by about 10%. The principal advantage of the automatic technique, which is based on proteolysis of a standard 3.5% hemoglobin solution at pH 2.0 and 37C for 7 min, followed by dialysis and colorimetric determination of the resulting peptides, is that a large number of samples can be analyzed rapidly under absolutely identical conditions. This facilitates the chromatographic analysis of samples of gastric juice or crude pepsin, for example, as well as the continuous analysis of gastric pepsin secretion in response to stimuli. In 4 human subjects, injection of 6 μg/kg of synthetic pentapeptide resulted in an immediate "washing out" of pepsinogen from the tubules, followed by a marked drop in pepsin secretion (from 1100-1600 to 790-1300 μg/ml) after 15-26 min, with a slow return to normal values. The preliminary kinetic studies on which the selection of the substrate and conditions of automatic proteolysis and dialysis were based are also reported in detail, and it is pointed out that human pepsin, rather than tyrosine, would be the ideal reference standard if it were available.

2698 INTESTINAL BLOOD FLOW DURING PERFUSION OF THE JEJUNUM WITH HYPERTONIC GLUCOSE IN DOGS.

(E.) Van Heerden, P. D. (Johns Hopkins Med. Inst., Baltimore, Maryland), H. N. Wagner and S. Kaihara. *Amer. J. Physiol.* 215(1): 30-33, 1968.

The effects of jejunal glucose (5% and 25%) perfusion on intestinal blood flow were investigated in 10 phenobarbital anesthetized adult mongrel dogs (7-15 kg) by means of xenon (^{133}Xe) clearance; a 20 cm loop of proximal jejunum was isolated, and the superior mesenteric artery cannulated for the injection of 1 mC/ml of ^{133}Xe saline solution. The femoral artery was cannulated for blood pressure monitoring. Microspheres labelled with scandium (^{46}Sc) and strontium (^{85}Sr) were used to determine the localization of increased intestinal blood flow. Although 5% glucose perfusion did not significantly alter blood flow, 25% glucose caused a 52% increase in intestinal blood flow above control levels. Femoral arterial pressure was unaffected by perfusion. Perfused jejunum showed 54% more radioactivity than unperfused regions. This increase correlated well with the increase measured by ^{133}Xe clearance.

2699 EXTRA-GASTROINTESTINAL EFFECTS OF SECRETIN, GASTRIN, AND PANCREOZYMIN.

(E.) Lazarus, N. R. (VA Hosp., Washington, D. C.), N. R. Voyles, S. Devrim, T. Tanese and L. Recant. *Lancet* 2(7562):248-250, 1968.

Experiments were conducted to determine the degree to which secretin, gastrin, and pancreozymin stimulate 1) the *in vitro* release of free fatty acids from adipose tissue, and 2) the *in vivo* release of insulin. Pancreozymin (0.63 U/ml) and gastrin (0.15 μg/ml) had no effect on the release of free fatty acids from rat fat pads *in vitro*, a process which was markedly stimulated by 0.1 U/ml of secretin. The activity of secretin, which was 30-600 times that of an equivalent dose of glucagon, was potentiated by theophylline (180 μg/ml) and was not affected by phentolamine and/or propanolol, indicating that secretin and glucagon probably have similar binding sites and mechanisms of action. However, none of the three hormones showed any glucagon-like hyperglycemic or glycogenolytic activity. Thus, the glucose output in perfused isolated rat liver preparations was unaffected by pancreozymin (10-20 U), secretin (1-10 μg) or gastrin (10 μg). Although all three hormones (at doses of 0.3 U, 0.1 U, and 0.5 μg, resp.) increased circulating insulin levels *in vivo*, the effect on pieces of rat pancreas *in vitro* was equivocal.

2700 ENHANCEMENT OF ALIMENTARY LIPEMIA BY PREPRANDIAL ALCOHOL.

(E.) Barboriak, J. J. (Wood VA Ctr., Milwaukee, Wisconsin) and R. C. Meade. *Amer. J. Med. Sci.* 255(4):245-251. 1968.

The effects of dietary fat content on the lipemic response to preprandial alcohol were studied in 25 male volunteers (25-76 yr of age). After an overnight fast, 16 subjects received 105 g of fat in the morning meal during which each received a capsule containing ^{131}I-triolein (25 μC); thyroid uptake had been blocked by previous potassium iodide administration. Venous blood samples were drawn prior to and 1, 3, 6, 8, 12, and 25 hr after the meal. After an interval of 2-5 days, the test was repeated with 120 ml of 50% alcohol given 15 min preprandially. The other 9 subjects were given 63 g of fat after an overnight fast; the meal included cream containing 20 μC of triolein-1-^{14}C. The test meal was given 1 week later, preceded by 120 ml of 50% alcohol. Preprandial alcohol ingestion enhanced the usual postprandial alimentary lipemia in both groups; the maximum rise occurred 6 hr after the meal. The higher plasma triglyceride levels were not reflected in higher blood ^{131}I activity. The differences in plasma triglyceride levels in the experiments with and without alcohol were statistically significant at both 3 and 6 hr. The ^{14}C activity of plasma lipids correlated with plasma triglyceride levels; the rate of absorbed ^{14}C-triolein metabolic utilization as represented by expired $^{14}CO_2$, decreased after alcohol ingestion. No correlation existed between blood alcohol levels and changes in plasma triglycerides. The data indicate that preprandial alcohol ingestion causes a larger increase in plasma triglycerides than would be expected if the lipemic effects of the meal and alcohol were additive only.

2701 LYMPHOEPITHELIAL TISSUES OF THE INTESTINE AND DIFFERENTIATION OF ANTIBODY PRODUCTION.

(E.) Perey, D. Y. E. (Dept. Pediat. &

Surg., U. Minnesota, Minn.), M. D. Cooper and R. A. Good. *Science* 161(3838):265-266, 1968.

Normal rabbits which had lymphoepithelial tissue (appendix, sacculus rotundus, and Peyer's patches) excised, or which underwent sham excision, thymectomy, or appendectomy, and unoperated controls were bled at 8 weeks of age and given 10^9 killed *Brucella abortus* organisms i.m. in a study of the antibody-producing tissue of the intestine. The animals were irradiated (1250 roentgen doses) within 24 hr and immediately injected with nucleated viable liver cells from 20-day-old fetuses. They were bled again 4, 7, 14, 21, 28, 35, and 42 days after immunization. Rabbits with intact lymphoepithelial tissue showed early significant antibody response. Animals subjected to the extirpative surgery and irradiation exhibited no antibody response to the injected organisms. Thymectomy, splenectomy, or lymph node removal did not interfere with the antibody responsiveness; appendectomy alone delayed but did not suppress the agglutinin response. Intestinal lymphoepithelial tissue plays an important lymphoid function and is responsible for differentiation of lymphoid cells which produce specific antibodies and immunoglobulins.

2702 OBSERVATIONS UPON SMALL GUT "MUCOSAL" pO_2 AND pCO_2 IN ANESTHETIZED DOGS. *(E.)* Hamilton, J. D. (St. Bartholomew's Hosp., London, England), A.M. Dawson and J. P. W. Webb. *Gastroenterology* 55(1):52-60, 1968.

The mucosal pO_2 and pCO_2 was measured in closed loops of jejunum and ileum in 18 anesthetized fasted dogs (pentobarbitone, 60 mg/kg i.v., followed by N_2O/O_2 for 8-12 hr) using a tonometric method with fluid having known initial pO_2 and pCO_2 levels in the lumen. A steady value, which was taken as the mucosal pO_2 and pCO_2, was usually obtained in 15-20 min, but the values themselves varied over a wide range. During prolonged anesthesia, mucosal pO_2 fell from 1-57 to 0-40 mm Hg while the pCO_2 gradient between the intestinal mucosa and the arterial blood increased from 4-44 to 12-130 mm Hg, despite a steady arterial pO_2 (95-130 mm Hg) and pCO_2 (20-50 mm Hg). This decrease in pO_2 was usually accompanied by a decrease in arterial blood pressure. The mucosal pO_2 increased during anesthesia in only 2 of 18 dogs, while the pCO_2 gradient decreased in 2 of 15 and remained constant in 2 of 15. Evidence is presented to show that the high pCO_2 gradients were not the result of chemical interaction but of factors such as tissue perfusion, CO_2 diffusion and CO_2 production, all reflecting the mucosal cell pCO_2 and resulting from a gradual deterioration in the physical condition of the small intestinal mucosa during prolonged anesthesia. It is pointed out that such decreases in mucosal O_2 tension doubtlessly affect the normal function of the absorptive epithelium.

2703 ANTIBODIES TO THE CARBOXYL-TERMINAL TETRAPEPTIDE AMIDE OF GASTRIN IN GUINEA PIGS. *(E.)* McGuigan, J. E. (Washington U. Sch. Med., St. Louis, Missouri). *J. Lab. Clin. Med.* 71(6):964-970, 1968.

C-terminal gastrin tetrapeptide-bovine gamma globulin conjugate (2 mg) in 0.15 M NaCl-0.01 M phosphate buffer were injected into 6 Hartley strain guinea pigs three times – once 2 weeks and once 6 months after initial immunization; 6-10 ml of blood were drawn 14 days after each immunization. The tetrapeptide amide, acylated with ^3H-acetic anhydride (159 mC/millimole), was used in competitive binding experiments with unlabeled peptides by gel filtration. Charcoal immunoassay was also used for antibody identification. Antibodies were detected by both gel filtration and charcoal immunoassay in the sera of 4 guinea pigs after the second immunization and in 2 after initial immunization. The results were the same whether unlabeled gastrin peptides were in phosphate buffer or normal human serum. Reproducibility was better with the charcoal immunoassay. The sensitivity of gastrin measurement by gel filtration is similar with rabbit and guinea pig antibodies to the C-terminal tetrapeptide amide.

2704 THE PROLIFERATIVE REACTIVITY OF THE INTRAHEPATIC BILE DUCTS. *(It.)* Castiglioni, G. C. (Inst. Gen. Clin. Surg., Cath. U. Sacred Heart, Rome, Italy), E. Alcini and A. Wiel-Marin. *Epatologia* 13(3):627-646, 1967.

The pathogenesis of intrahepatic bile duct proliferation, the intensity and extent of the proliferative process, and its repercussions on intrahepatic blood flow and the production and composition of the bile were investigated in adult albino rats subjected either to ligation of the common bile duct or to the s.c. administration of α-naphthylisothiocyanate in olive oil (50-100 mg/kg). Studies in rats sacrificed 3-51 days after ligation of the common bile duct revealed rapid biliary proliferation originating in the interlobular zone, the portobiliary spaces of the intercellular canaliculi and the undifferentiated segments of the ductules of Hering. After one week, the lobule was surrounded by newly formed ducts, which then began to invade the lobular structure, and by 50 days after choledochal ligation the lobule had been completely transformed. If ligation of the common bile duct was followed by recanalization 1-51 days later, rapid regression of the proliferative epithelium was observed, with intense hepatic regeneration (proliferation of hepatocytes, reabsorption of newly formed bile ducts and restoration of the lobular architecture) which was complete in 12-15 days if cholestasis had not been allowed to persist for more than 21 days. After longer periods of cholestasis, hepatic regeneration was irregular and incomplete. Administration of α-naphthylisothiocyanate, either 50 mg/kg/day for 2 weeks followed by the same dose every other day for 16 weeks, or 100 mg/kg every other day for 30 days, resulted in proliferation of fibroblast-like elements and hyperplasia of the intrahepatic bile ducts, accompanied initially by inflammatory infiltration and resulting in involvement of the entire periphery of the lobule by newly formed tubules. Discontinuation of the chemical was followed by a gradual reversal of the entire process. Following either choledochal ligation or administration of α-naphthylisothiocyanate, the serum cholesterol and serum bilirubin increased while the concentrations of these compounds in the bile decreased, as did the concentration of lipids and acid phosphatase (alkaline phosphatase and sodium chloride in the bile increased). The biliary volume increased to such an extent (70-140%) after ligation, however, that the output of bilirubin and cholesterol was actually increased.

2705 **PATHOGENESIS OF ACUTE GASTRIC STRESS ULCERS.** *(E.)* Goldman, H. (Beth Israel Hosp., Boston, Mass.) and C. B. Rosoff. *Amer. J. Path.* 52(1):227-236, 1968.

A correlative histological, ultrastructural and mucin-histochemical study of the gastric mucosa was undertaken in immobilized, fasted, Charles River CD-strain rats in order to delineate the various factors involved in the pathogenesis of gastric stress ulcers. Rats were immobilized in wire mesh for 4-20 hr, half of them having received polymyxin B p.o. (25 mg% in the drinking water and 6 mg/day by gavage) for the previous 3 days. Gastric ulcers were found at autopsy in 5-100% of untreated and 1-92% of polymyxin-treated rats, depending on the period of restraint (59% and 29%, resp., after 12 hr of restraint). The fully developed ulcers were linear, hemorrhagic, mucosal infarctions, characterized by a peripheral zone of coagulative necrosis and a superficial region of ulceration and hemorrhage; they were generally 1 mm thick and 6 mm long, and were located parallel to and near the crest of the rugae in the midportions of either the anterior or the posterior wall of the glandular corpus. Signs of vagal overactivity, including prominent muscular contraction and increased gastric acid secretion, were observed before the development of the mucosal lesions, along with dilatation of the mucosal veins and ultrastructural signs of damage to the muscularis mucosa. These findings suggest that localized ischemia may play an important preconditioning role. This ischemia may result in part from the muscular contraction and extrinsic compression of the intramural vessels, leading to degeneration of the superficial mucous cells. Although gastric acid secretion is increased, the ulceration probably results more from the action of the acid on a mucosa that has been previously damaged by ischemia. Rats with reduced bacterial flora as a result of polymyxin treatment failed to show the heightened motor and secretory effects of vagal overactivity and the ultrastructural changes in the muscularis in the early stages of restraint. Since this was accompanied by a significant decrease in ulcer development, this supports the concept that circulating bacterial products of intestinal origin may contribute to the excessive central hypothalamic and vagal stimulation in restraint stress which leads to gastric ulceration.

2706 **THE MECHANISM, ORGANIZATION AND REGULATION OF THE LIVER REGENERATION (EXPERIMENTAL STUDY).** *(E.)* Iconomidis, M. G. (Thessalonika, Greece). *Epatologia* 13(3):681-688, 1967.

The stimuli and mechanisms of hepatic regeneration were investigated in experiments on 50 mongrel dogs (32 males and 18 females) subjected to 40-70% hepatectomy under nembutal anesthesia (30 mg/kg i.v.) and sacrificed 1-70 days postoperatively. Although the blood prothrombin level was unchanged after resection, there were increases in serum cholesterol, flocculation, alkaline and acid phosphatase and serum amylase and decreases in blood sugar, blood urea nitrogen and plasma albumin. The regenerative process is divided into two major stages: hypertrophy of the hepatocytes preceded by hyperemia, edema and leukocyte infiltration during the first 10 days after resection, and hyperplasia of the hepatocytes during the next 30 days, characterized initially by prominent Kupffer cells, hyperchromic nuclei of varying size with a foamy cytoplasm and an increase in thickness of the hepatic cords, and later by an increase in cytoplasm with the appearance of many double nuclei. By 50 days after resection, the liver parenchyma shows only increased cellularity, and by 70 days the structure is essentially normal. The initial stimulus to regeneration is concluded to be the loss of functional hepatic tissue, the extent of regeneration being proportional to the amount resected. Regeneration is favored by simultaneous splenectomy or subsequent administration of anabolic drugs; it involves all of the residual lobes, to an extent proportional to their size, and often results in a liver weighing more than normal. Regeneration is less vigorous in older animals, but is not affected by sex.

2707 **EFFECT OF BILE AND PANCREATIC JUICE ON THE INTESTINAL LIPIDS OF THE SHEEP.** *(E.)* Leat, W. M. F. (Agric. Res. Council, Inst. Animal Physiol., Babraham, Cambridge, England) and F. A. Harrison. *Biochem. J.* 105(3):13P, 1967.

2708 **GERMFREE SURGICAL RESEARCH: CURRENT STATUS.** *(Rev.)(E.)* Cohn, I. Jr. (Louisiana State U. Sch. Med., New Orleans), J. B. Heneghan, F. C. Nance, G. H. Bornside, J. L. Cain, S. K. Yu and J. A. Labat. *Ann. Surg.* 66(1):518-529, 1967.

2709 **GASTRIC MUCOSAL BLOOD-FLOW IN THE DOG MEASURED BY CLEARANCE OF KRYPTON$_{85}$–THE RESPONSE TO HISTAMINE.** *(E.)* Bell, P. R. F. (Dept. Surg., U. Glasgow, Scotland), C. Battersby and A. M. Harper. *Brit. J. Surg.* 54(12):1003-1007, 1967.

2710 **EFFECT OF ENVIRONMENTAL INFLUENCES ON ALIMENTARY LIPEMIA OF THE RAT.** *(E.)* Friedman, M. (Mt. Zion Hosp., San Francisco, Calif.) and S. O. Byers. *Amer. J. Physiol.* 213(6):1359-1364, 1967.

2711 **THE REGULATION OF CHOLESTEROL METABOLISM.** *(E.)* Myant, N. B. (Hammersmith Hosp., London). *Postgrad. Med. J.* 94(507):86-88, 1968.

2712 **SPECIFIC LOSS OF THE HYPOGLYCEMIC CONTROL OF FEEDING IN RECOVERED LATERAL RATS.** *(E.)* Epstein, A. N. (U. Pennsylvania, Philadelphia) and P. Teitelbaum. *Amer. J. Physiol.* 213(5): 1159-1167, 1967.

2713 **JEJUNAL EPITHELIUM IN TRANSMISSIBLE GASTROENTERITIS OF SWINE.** *(E.)* Thake, D. C. (Nat'l. Animal Dis., Lab., Ames, Iowa). *Amer. J. Path.* 53(1):149-168, 1968.

2714 **TISSUE REGENERATION (MITOSIS) UNDER CONDITIONS OF ALTERED GRAVITY.** *(E.)* Talarico, K. S. (Ames Res. Ctr., NASA Moffett Field, Calif.), E. D. Neville and D. D. Feller. *Epatologia* 13(2):381-387, 1967.

2715 **MAGNESIUM METABOLISM.** *(E.)* Wacker, W. E. C. (Peter Bent Brigham Hosp., Boston, Mass.) and A. F. Parisi. *New England J. Med.* 278(13):712-717, 1968.

2716 A NOTE ON THE FISHER-PARSONS SURFACE AREA FORMULA IN THE LIGHT OF MUCOSAL FRESH AND DRY WEIGHTS OF RAT SMALL INTESTINE. *(E.)* Hanninen, O. (Dept. Physiol., U. Turku, Finland). *Scand. J. Gastroent.* 3(1):110-111, 1968.

2717 CELL RENEWAL IN THE INTESTINE OF THE BILE DUCT CANNULATED RAT. *(E.)* Fry, R. J. M. (Div. Biomed. Res. Argonne Natl. Lab., Illinois), W. E. Kisieleski, B. Kraft, E. Staffeldt and M. F. Sullivan. [Pp. 142-147 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2718 ACUTE INTESTINAL RADIATION DEATH IN GERMFREE AND CONVENTIONAL MICE. *(E.)* Wilson, R. (U. Notre Dame, Ind.), P. Bealmear and T. Matsuzawa. [Pp. 148-158 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2719 STUDIES ON DNA METABOLISM IN ISOLATED PERFUSED INTESTINE OF NORMAL AND X-IRRADIATED RATS. *(E.)* Gerber, G. B. (Dept. Radiobiol., Ctr. Nuclear Energy Studies, Mol, Belgium) [Pp. 159-166 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2720 MUCOSAL CELL KINETICS IN PATIENTS EXPOSED TO ABDOMINAL IRRADIATION. *(E.)* Wiernik, G. (United Oxford Hosps., England). [Pp. 167-174 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2721 A CONTRIBUTION TO THE STUDY OF THE INTRAHEPATIC ARTERIAL CIRCULATION. *(Fr.)* Magaldi, P. (Inst. Anat., U. Cordoba, Argentina), A. Suarez and R. Gimenez. *Epatologia* 13(5):955-962, 1967.

2722 STUDIES ON THE EXPERIMENTAL GASTROINTESTINAL ULCERS PRODUCED BY RESERPINE AND STRESS. II. ULCEROGENIC ACTIVITIES OF RESERPINE AND ITS ANALOGUES. *(E.)* Doteuchi, M. (Shionogi Res. Lab., Fukushima-ku, Osaka, Japan). *Jap. J. Pharmacol.* 118(1):130-138, 1968.

2723 DIFFERENTIAL EFFECTS OF IRRADIATION ON GASTRIC ACID AND BIOELECTRIC POTENTIAL IN THE RAT. *(E.)* Vaughan, B. E. (Biomed. Sci. Div., U. S. Naval Radiol. Defense Lab., San Francisco, Calif.), J. T. Cummins and H. A. Ridley. [Pp. 242-250 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2724 PROTECTION AGAINST WHOLE-BODY IRRADIATION BY DIETS OF INERT NON-ABSORBABLE SUBSTANCES. *(E.)* Friedman, M. H. F. (Dept. Physiol., Jefferson Med. Coll., Philadelphia, Pa.), M. F. Tansy, L. M. Rosenfeld and S. Kramer. [Pp. 421-432 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2725 RATE OF DEVELOPMENT OF INTESTINAL DAMAGE IN THE GOLDFISH AFTER X-IRRADIATION AND MUCOSAL CELL KINETICS AT DIFFERENT TEMPERATURES. *(E.)* Hyodo-Taguchi, Y. (Div. Biol., Natl. Inst. Radiol. Sci., Chiba, Japan). [Pp. 120-126 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2726 IRRADIATION OF THE GASTROINTESTINAL TRACT OF THE RAT BY INSOLUBLE BETA EMITTERS. *(E.)* Tuttle, L. W. (Delta Regional Primate Res. Ctr., Tulane U., Covington, La.) and W. E. Rothe. [Pp. 485-497 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2727 INTERRELATIONS BETWEEN X-IRRADIATION AND THE INTESTINAL FLORA OF MICE. *(E.)* Fritz, T. E. (Biomed. Res. Div., Argonne Natl. Lab., Ill.), P. C. Brennan, J. A. Giolitto and R. J. Flynn. [Pp. 279-291 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2728 TRIGLYCERIDE SYNTHESIS IN PIG INTESTINAL EPITHELIUM. *(E.)* Bickerstaffe, R. (Unilever Res. Lab., Colworth House, Sharnbrook, Bedford, England) and E. F. Annison. *Biochem. J.* 105(3):35P, 1967.

2729 **EFFECT OF DIET ON THE STRUCTURE AND FUNCTION OF THE PANCREAS IN RATS. III. MECHANISMS OF PANCREATIC ADAPTATION TO CHANGES IN FOOD SUPPLY.** *(Sl.)* Bučko, A. (High. Inst. Human Nutr., Bratislava, Czechoslovakia) and Z. Kopec. *Cesk. Gastroent. Vyz.* 22(2):59-64, 1968.

Comparative biochemical studies on pancreas homogenates prepared from male Wistar rats after 4 weeks on vitamin-supplemented diets with varying amounts of carbohydrate, protein and fat showed that pancreatic amylase, lipase, and protease are increased significantly during adaptation to diets high in carbohydrate (75% starch, 15% casein, 4% corn oil), fat (58% corn oil, 25% casein, 11% starch) and protein (70% casein, 20% starch, 4% corn oil), resp. The normal control diet contained 61% starch, 24% casein and 9% corn oil. All the experimental diets led to a slight increase in the total protein content of the pancreas. On the high-carbohydrate diet, pancreatic amylase was increased by 135.9% and protease by 39.6%, while the lipase fell to 24.9% of the normal level. On the high-protein diet, pancreatic protease increased by 85.7%, while the amylase fell slightly to 96.5% of normal and the lipase fell to 58.6% of normal. On the high-fat diet, pancreatic lipase increased by 33.1% while the amylase and protease decreased to 85.2 and 87.7% of their normal levels, resp. A direct correlation could be established between the percentage of corn oil in the diet and the lipase activity of the pancreas. In other experiments, when rats which had been adapted to a high-carbohydrate diet for 4 weeks were switched to a high-protein diet, there was a gradual decrease in pancreatic amylase and increase in protease over the course of 15 days. The only significant histological changes after 4 weeks on the experimental diets were a quantitative increase in zymogen granules in the pancreatic acini on the high-carbohydrate and high-protein diets, and a moderate decrease in Feulgen DNA staining in the nuclei of the acinar cells on the high-fat diet.

2730 **EFFECT OF STARVATION ON THE TISSUE COMPOSITION OF THE SMALL INTESTINE IN THE RAT.** *(E.)* Steiner, M. (Dept. Nutrition and Food Science, Massachusetts Inst. Tech., Cambridge), H. R. Bourges, L. S. Freedman and S. J. Gray. *Amer. J. Physiol.* 215(1):75-77, 1968.

The DNA, RNA, protein, and tissue water contents of the entire small intestine were measured in 9 control male albino rats (350-390 g) and 11 rats starved for 6 days; the animals were given only water and coprophagia was prevented. Intestinal tissue was weighed and homogenized with physiological saline; another phase of the experiment involved determining the same parameters in small intestinal mucosa only. Rats showed 32% weight loss after starvation, with a 53% reduction in small intestine mass. Water and protein content fell 50%. RNA content was reduced 49% in sharp contrast to a 36% reduction in DNA content. Water, RNA, and protein contents showed approximately 20% reductions when calculated on a per-mg of DNA basis. Mucosal studies revealed reductions similar to whole small intestine values; DNA, RNA, and protein were reduced 27%, 40%, and 48%, resp. Water loss primarily reflects a loss of cellular water; starvation does not affect the relative proportions of the extracellular water space. The data obtained confirm previous reports of reduced cell proliferation and a reduction in epithelial cells in the small intestine during starvation.

2731 **EFFECT OF FASTING AND REFEEDING ON THE HISTOLOGY AND DISACCHARIDASE ACTIVITY OF THE HUMAN INTESTINE.** *(E.)* Knudsen, K. B. (Scott & White Clin., Temple, Tex.), E. M. Bradley, F. R. Lecocq, H. M. Bellamy and J. D. Welsh. *Gastroenterology* 55(1):46-51, 1968.

Human jejunal morphology and enzyme activity was studied by biopsy (Crosby capsule) from the area of the ligament of Treitz during 3-28 day periods of absolute fasting (water only) and following single-substrate refeeding for 10 days in 26 obese but otherwise healthy volunteers (25 men and 1 woman, 19-43 yr old, including 18 Caucasians and 8 Negroes) hospitalized at the Wilford Hall Hosp. of Lackland Air Force Base. The only complication resulting from the fast was vomiting and hypotension on the 28th day in 1 of 3 patients. The mean weight loss during the fast was 649-721 g/day. As early as 3 days after the start of the fast, protein, sucrase, maltase and palatinase levels were significantly decreased compared to prefast levels; lactase activity was significantly decreased after 7 days in those with initially normal lactase activity, but was unchanged in 3 Caucasians and 6 Negroes with isolated lactase deficiencies. Alkaline phosphatase was significantly decreased after 14 days of fasting. At no time, however, were there any significant changes in the histology of the small intestinal mucosa (light microscopy). Refeeding was carried out in 11 subjects after 14 days of fasting, using either lactose or glucose, 120 g/day p.o. or i.v., providing 480 calories/day, or corn oil, 55 cc/day p.o., providing 408 calories/day. During refeeding, weight loss continued at 202 g/day in those fed carbohydrates and at 339 g/day in those fed corn oil. Most of those fed corn oil and 1 of those fed lactose complained of abdominal cramps and mild diarrhea. Lactose had no specific effect on lactase activity, and corn oil produced no change whatsoever in enzyme levels. Carbohydrate refeeding produced significantly increased levels of protein, sucrase, maltase and alkaline phosphatase.

2732 **THE FINE STRUCTURE OF HUMAN RECTAL MUCOSA: THE EPITHELIAL LINING OF THE BASE OF THE CRYPT.** *(E.)* Lorenzsonn, V. (VA Hosp., Madison, Wis.) and J. S. Trier. *Gastroenterology* 55(1):88-101, 1968.

The morphological and cytochemical features of the epithelial cells at the extreme base of the rectal crypts were studied by light and electron microscopy in 9 rectal biopsies (taken approximately 8 cm from the anus) from 8 normal human volunteers. The structural organization and morphology of the basal epithelium, defined as the deepest 10-20 epithelial cells in the crypt section and extending from the basal lamina to the crypt lumen, were found to distinguish this region clearly from the upper crypt and surface epithelia. Thus, the base contains no differentiated goblet or absorptive cells, but abundant well-differentiated enterochromaffin cells as well as undifferentiated cells. The luminal surface has only a few rudimentary microvilli, but is covered with a glycoprotein fuzzy coat containing acid mucopolysaccharide. The apical cytoplasm of both the differentiated and the undifferentiated cells contains at least 2 different types of small vesicles, distinguished from one another by the width of the enveloping membrane and by the affinity of the membrane for methenamine silver. These intracytoplasmic vesicles appear to contain glycoprotein. The abundant enterochromaffin cells contain many prominent lysosomal structures and show acid phosphatase activity at the periphery of many of the heteromorphous intracytoplasmic secretory granules. Differentiating cells with structural features which suggest differentiation toward enterochromaffin cells are most common in the deeper portions of the crypt base, while cells with structural features which suggest differentiation toward mucus-secreting goblet cells are seen primarily near the upper limit of the base.

2733 D.N.A. AND CELL LOSS FROM NORMAL SMALL-INTESTINAL MUCOSA: A CLINICAL METHOD OF ASSESSING CELL TURNOVER. *(E.)* Croft, D. N. (St. Thomas's Hosp., London, England), C. A. Loehry, J. F. N. Taylor and J. Cole. *Lancet* 2(7559):70-73, 1968.

In 7 fasting patients (6 men and 1 woman, 40-78 yr old) with apparently normal small intestines undergoing duodenal intubation for tests of pancreatic function, the DNA loss rate, which is interpreted as reflecting the turnover of epithelial cells in the small intestine, was determined by washing the duodenum with isotonic saline using a triple-lumen tube which made possible a correction for the DNA normally originating in the saliva, gastric and pancreatic juice, and bile. The mean DNA loss rate was 12.0 mμg-atoms DNA-P/min for a 5-cm segment of duodenum, which is equivalent to 500,000 cells/min. Cytological evidence indicated that the DNA loss rate reflected the natural loss of epithelial cells, which is therefore calculated to be on the order of 20-50 million cells/min for the whole human small intestine.

2734 HISTOLOGY AND CHEMICAL COMPOSITION OF THE SMALL BOWEL OF HYPOPHYSECTOMIZED RATS. *(E.)* Havivi, Y. (New England Med. Ctr. Hosps., Boston, Mass.), E. Havivi and R. Levitan. *Amer. J. Dig. Dis.* 13(8):735-742, 1968.

The lipid, protein, phosphorus, total nitrogen, RNA, DNA, uronic acid and sialic acid contents of small bowel tissue homogenates were measured to determine the effects of hypophysectomy on small intestine histology and biochemistry. The small bowel of hypophysectomized rats was smaller, its villi shorter, broader, blunt, and infiltrated with lymphocytes. No significant differences were found in intestinal protein, phosphorus, RNA, and DNA in control and hypophysectomized animals. Uronic and sialic acid concentrations were smaller in hypophysectomized rats, and lipids were present in greater amounts. The most likely explanation for the observed histological and chemical changes in the small bowel of hypophysectomized rats is hormonal deficiency. The increased absorption of nutrients early after hypophysectomy suggests a physiological compensatory mechanism.

2735 ULTRASTRUCTURAL CHANGES OF THE PIG LIVER FOLLOWING VASCULAR INTERRUPTION. *(E.)* Slagel, D. E. (U. Kentucky Med. Ctr., Lexington) and B. Eiseman. *Israel J. Med. Sci.* 4(1):8-20, 1968.

A comparative electron-microscopic study was carried out on 4 groups of adult pig livers: some were fixed immediately after sacrifice of the donors (overdose of barbiturates), while others were left in the abdomen for 30-60 min after sacrifice (at which point the temperature had fallen to 38.5 and 37.5C, resp.) and still other livers were allowed to cool for 4.5 hr at room temperature after excision from a liver donor (anesthetized with Nembutal, 4 mg/kg i.v.), resulting in a drop in temperature to 25C. As compared to livers fixed immediately after sacrifice, those allowed to cool at room temperature showed only minimal ultrastructural damage at 4.5 hr, limited to a moderate decrease in glycogen, loss of mitochondrial matrix granules, vesiculation of smooth endoplasmic reticulum, and occasional rupture of the plasma membrane adjacent to hepatic sinusoids. Livers left within the cadaver for 30 min showed signs of definite degeneration with extensive intracellular edema, occasional rupture of the cell membrane where it opened onto the space of Disse, cytoplasmic vacuolization, swollen and misshapen mitochondria, complete loss of glycogen deposits, extensive vesiculation of both smooth and rough endoplasmic reticulum, swelling of microvilli in the biliary canaliculi, and the appearance of cytosomes. After 1 hr at 38C, the livers showed advanced cellular deterioration with, in addition to the necrotic changes described above, mitochondrial disintegration, numerous cytosomes filled with the debris of broken organelles, and complete disorganization of the endoplasmic reticulum. The cell nucleus and its nucleoplasm, however, showed remarkable resistance to this degree of ischemia. The agreement between these anatomic findings and the previous metabolic studies on perfused livers emphasizes the importance of immediate harvest and cooling of a liver intended to use as a homograft or temporary extracorporeal heterograft.

2736 RIBONUCLEIC ACID (RNA) OF THE EPITHELIUM OF THE SMALL INTESTINE IN ORGANOGENESIS AND IN PORTAL HYPERTENSION. AN EXPERIMENTAL STUDY. *(E.)* Cavalli, G. (Inst. Gen. Clin. and Therapeut. Med., U. Bologna, Italy), G. Bacci, F. B. Bianchi and A. M. Casali. *Digestion* 1(1):27-32, 1968.

The importance of nucleic acids in cellular metabolism was investigated in 12 male albino rats, including 3 18-day-old fetuses and 9 adults, 6 of which had experimentally induced portal hypertension; the effect of mitotic activity on nucleolar RNA content in animals in which the more complex metabolic processes were still negligible prompted the embryological studies. The 6 animals with portal obstruction were sacrificed 1 month after surgery. Intestinal tissue specimens were removed, fixed, sectioned, and stained for RNA. The average nucleolar RNA volume, greater in the crypts of Lieberkuhn than in the villi in normal rats, diminished with respect to the controls in the following order: rats with partial obstruction, embryos, and rats with total occlusion. It is probable that decreased nucleolus size reflects a decrease in nucleolar RNA. Cytoplasmic RNA and the karyokinetic activity of intestinal cells of rats with portal occlusion appear unchanged by the experimental conditions.

2737 **STEROID EFFECTS ON THE SUBSTRATE PROFILE OF A LIVER ESTERASE.** *(E.)* Pantelouris, E. M. (Biol. Dept., U. Strathclyde, Glasgow, Scotland) and W. J. W. Hines. *Comp. Biochem. Physiol.* 26(1):129-136, 1968.

2738 **SUBCELLULAR DISTRIBUTION OF METALS (SODIUM, POTASSIUM, CALCIUM AND MAGNESIUM) IN RAT LIVER, KIDNEY AND INTESTINAL MUCOSA.** *(E.)* Murdoch, J. A. (Dept. Biol., U. Lancaster, England) and F. W. Heaton. *Comp. Biochem. Physiol.* 26(1): 121-128, 1968.

2739 **RIBOFLAVIN AND MOUSE HEPATIC CELL STRUCTURE AND FUNCTION.** *(E.)* Tandler, B. (Sch. Dentistry, Case Western Res. U., Cleveland, Ohio), R. A. Erlandson and E. L. Wynder. *Amer. J. Path.* 52(1):69-95, 1968.

2740 **MEDICAL PROGRESS: CELL RENEWAL PATTERNS.** *(E.)* Post, J. (Goldwater Mem. Hosp., Welfare Island, New York City) and J. Hoffman. *New Eng. J. Med.* 279(5):248-258, 1968.

2741 **GASTRIC SURFACE EPITHELIAL FUNCTION; A BIOCHEMICAL BARRIER.** *(E.)* Werther, J. L. (Dept. Med., Mt. Sinai Hosp., New York City). *Israel J. Med. Sci.* 4(1):55-59, 1968.

2742 **CELL PROLIFERATION KINETICS IN THE TONGUE AND INTESTINAL EPITHELIA OF HIBERNATING DORMICE.** *(E.)* Adelstein, S. J. (Harvard Med. Sch., Boston, Mass.), C. P. Lyman, R. C. O'Brien and S. Iro. [Pp. 111-119 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2743 **THE HUMORAL EFFECT OF INTESTINAL RESECTION ON CELLULAR PROLIFERATION AND MATURATION IN PARABIOTIC RATS.** *(E.)* Loran, M. R. (U. California Med. Ctr., San Francisco) and J. V. Carbone. [Pp. 127-141 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2744 **THE EFFECTS OF IONIZING RADIATION ON THE ENTEROCHROMAFFIN CELLS OF THE RAT, GUINEA PIG, AND SWINE GI TRACT.** *(E.)* Lebreuil, G. (Ctr. Nuclear Energy Studies, Fontenay-aux-Roses, France), G. Thiery, R. Masse and P. Nizza. [Pp. 444-451 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2745 **STRUCTURAL STUDIES ON THE PRINCIPAL GLYCOPROTEIN OF THE SHEEP COLONIC EPITHELIUM.** *(E.)* Kent, P. W. (Dept. Biochem., U. Oxford, England), J. P. Ackers and J. C. Marsden. *Biochem. J.* 105(3): 24P, 1967.

2746 **ON THE ETHIONINE-INDUCED INHIBITION OF PROTEIN SYNTHESIS IN MALE AND FEMALE RATS: LACK OF EFFECT ON INTESTINAL MUCOSA.** *(E.)* Schlunk, F. F. (U. Pittsburgh Sch. Med., Pa.), D. S. Longnecker and B. Lombardi. *Biochim. Biophys. Acta* 158(3):425-434, 1968.

2747 **BIOCHEMICAL EFFECTS OF CCl_4 ON RAT INTESTINAL MUCOSA.** *(E.)* Alpers, D. H. (Harvard Med. Sch., Boston, Mass.) and K. J. Isselbacher. *Biochim. Biophys. Acta* 158(3):414-424, 1968.

2748 **INTESTINAL ABSORPTION OF GLUCOSE AND LACTOSE IN MAN: STUDY OF 24 NORMAL SUBJECTS USING AN INTESTINAL PERFUSION TECHNIQUE.** *(Fr.)* Rambaud, J. C. (St. Lazare Hosp., Paris, France), J. D. Sraer, N. Vidon, F. Fabia and J. J. Bernier. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):61-74, 1968.

The small intestinal absorption of glucose and lactose was studied in 23 normal subjects (17 men and 8 women, 20-67 yr old) by perfusing the intestines with equimolar solutions (140 mM) of the 2 sugars. A total of 27 studies were carried out, 4 on the duodenum, 17 on the jejunum and 6 on the ileum. The perfusate, which was introduced at a rate of 8 ml/min, also contained 25-35 mM $CaCl_2$, 20-100 mM NaCl, and 1 g/liter polyethylene glycol 4000 as a marker to facilitate determination of the movement of water across the intestinal mucosa. Each loop of intestine explored was 25 cm long. The average absorption of glucose was 43.9 ± 20% in the duodenum, 53 ± 14.5% in the jejunum and 4.86 ± 20% in the ileum. Recalculated in terms of glucose absorbed/min/cm of intestine, this amounts to 20.0, 23.8 and 17.9 μmoles, resp. Lactose absorption, estimated from the reduction of ferricyanate by the test solutions, was much more variable from subject to subject. The average absorption was 15 ± 15% in the duodenum, 15.5 ± 11% in the jejunum and 13 ± 9% in the ileum. However, malabsorption of lactose (absorption of $<$10%) was observed in 5 of 16 jejunal perfusions, 1 of 4 duodenal perfusions, and 5 of 6 ileal perfusions. Among the 5 latter cases, 2 of 3 also showed jejunal malabsorption, while in the 3rd case it was 35%. The significance of the results on lactose absorption was impaired by the fact that the method used assumes that only negligible amounts of glucose and galactose are produced by hydrolysis of lactose in the intestine. Unfortunately, this is generally true only in the presence of disaccharide malabsorption.

2749 **MEASUREMENT OF THE AFFINITY OF HUMAN GASTRIC INTRINSIC FACTOR FOR CYANOCOBALAMIN.** *(E.)* McGuigan, J. E. (Washington U. Sch. Med., St. Louis, Mo.). *J. Lab. Clin. Med.* 70(4):666-672, 1967.

The affinity of human gastric intrinsic factor (HIF) for vitamin B_{12} was measured by means of equilibrium dialysis against varying concentrations of $^{57}Co\text{-}B_{12}$, using serum from patients with pernicious anemia to distinguish intrinsic factor binding from nonintrinsic factor binding. Gastric juice from 6 normal adult male volunteers was incubated at pH 10 and 20C for 30 min to inactivate pepsin, after which it was neutralized, diluted in buffer, and incubated at 37C either with excess Type I antiserum from the pernicious anemia patients or with buffer alone. The HIF saturation binding capacity and the proportion of HIF binding sites occupied by $^{57}Co\text{-}B_{12}$ at various concentrations were then determined. Total binding was 22.4-73.6 mμg $^{57}Co\text{-}B_{12}$/ml gastric juice (normal undiluted), 84.1-1-88.7% of which was bound by HIF. The mean affinity of HIF for vitamin B_{12} was found to be very high, with an intrinsic association constant of 0.38 [± 0.07] x 10^{10} M^{-1}. The heterogeneity index was calculated as 0.93-1.01 (mean 0.96), indicating little if any heterogeneity in the affinity of intrinsic factor binding sites for the vitamin. The binding of vitamin B_{12} by intrinsic factor was unaffected by changes in pH between 4.5 and 11.0. The great affinity of HIF for vitamin B_{12} is thought to play an important role in the binding and absorption of the small amounts of vitamin B_{12} normally found in the diet.

2750 **EXPERIMENTAL INVESTIGATIONS *IN VITRO* ON THE EFFECT OF CHRONIC ALCOHOL ADMINISTRATION ON IRON ABSORPTION IN THE SMALL INTESTINE OF RATS.** *(E.)* Hoszowska-Owczarek, A. (Med. Acad., Szczecin, Poland), L. Samochowiec and J. Wójcicki. *Acta Physiol. Pol. (Transl.)* 18(3):349-353, 1967.

In experiments on adult male Wistar rats, in which excised segments of small intestine were perfused for 30 min in a Wiseman apparatus with Krebs-Henseleit buffer containing 500 μg% of ferrous gluconate at 37C, administration of 20% ethanol (1.5 ml/100 g body weight p.o.) daily for 70 days had no significant effect on *in vitro* Fe absorption. Iron was determined by the method of Ramsay and absorption was calculated from the change in concentration in the perfusing fluid. Absorption of Fe was 71.78 μg/30 min in controls and 67.04 μg after treatment with alcohol. Fluid absorption, however, was significantly decreased by alcohol treatment, being only 0.9 ml/30 min in intestinal segments from treated rats compared to 2.3 ml in controls. This decrease, and the possible decrease in iron absorption, is related to local changes in the wall of the small intestine.

2751 **EFFECT OF ACUTE AND CHRONIC ETHANOL TREATMENT ON THE ABSORPTION OF IRON IN RATS.** *(E.)* Tapper, E. J. (Ohio State U. Sch. Med., Columbus), S. Bushi, R. D. Ruppert and N. J. Greenberger. *Amer. J. Med. Sci.* 255(1):46-52, 1968.

In experiments using isolated loops of duodenum from fasted female Carworth rats, the i.p. or p.o. administration of a single large dose of either 86-proof blended whiskey or ethanol (3.2 g/kg) significantly decreased the absorption of $^{59}FeSO_4$ from the intestine. The mucosal uptake of Fe was 53.8-54.8% after ethanol and 61% after whiskey, compared to 64.4% in controls, and the mucosal Fe transfer was 23.4-26.5%, 23.3% and 37.9%, resp. However, daily i.p. injections or oral administration of ethanol in increasing doses for 4 weeks, or transfer to an ethanol liquid formula diet, had no significant effect on Fe absorption from isolated duodenal loops, nor on the mucosa-to-serosa transfer of $^{59}FeSO_4$ in everted duodenal sacs obtained from such rats (control values of 22.5 ± 8.9 and 19.8 ± 6.3 mμmoles in proximal and distal sacs, resp.). After administration of increasing doses of whiskey for 4 weeks, the Fe uptake was still 58.7% but the mucosal transfer in isolated duodenal loops was reduced to 23.3%. These results indicate that chronic ethanol treatment does not increase the absorption of iron in the rat, despite induction of a fatty liver. The mechanism of the acute effect remains unknown. It is pointed out that these results may not be applicable to man, in which nutritional cirrhosis of the liver is usually accompanied by increased Fe absorption.

2752 **RATE OF INITIAL ENTRY OF ^{47}Ca AND ^{85}Sr FROM THE INTESTINE INTO THE VASCULAR SPACE.** *(E.)* Hart, H. (Med. Physics Lab., Montefiore Hosp., New York City) and H. Spencer. *Proc. Soc. Exp. Biol. Med.* 126(2):365-371, 1967.

The rate of initial entry of radioactive calcium and strontium from the gastrointestinal tract into the vascular system was determined in 4 male subjects, 31-46 yr, 3 of whom (42-46 yr) had mild osteoporosis. The subjects were on a low-calcium diet providing an average of 209 mg Ca and 750 mg P daily. A single tracer dose of ^{47}Ca and ^{85}Sr was given both orally and intravenously in separate studies and serial samples of plasma, urine and feces were obtained for radioassay. Radioassays were performed in a well-type NaI crystal γ-scintillation counter equipped with a single channel pulse height analyzer, and calculations were done on a digital computer. The plasma concentration of both isotopes reached a maximum 4 hr after oral administration, the Ca concentration being consistently higher than the Sr concentration. The maximal rate of initial entry of ^{47}Ca per 15-min interval was reached within 90 min and ranged from 2.2% to 3.8% of the dose. The maximal rate was sustained for about 1 hr, after which the rate gradually decreased. The rate of initial entry for ^{85}Sr was less than that for ^{47}Ca, not exceeding 1.5% of the dose in any 15-min interval, but was relatively more constant from the 1st to the 4th hr. After the 4th hr, the rates of initial entry of radioactive Sr and Ca were almost proportional.

2753 **WATER AND ELECTROLYTE TRANSPORT DURING MAINTENANCE OF ISOTONICITY IN HUMAN JEJUNUM AND ILEUM.** *(E.)* Phillips, S. F. (Mayo Clin., Rochester, Minn.) and W. H. J. Summerskill. *J. Lab. Clin. Med.* 70(4):686-698, 1967.

The relations between intraluminal concentrations and transmucosal fluxes of cations and anions in the upper jejunum and lower ileum were determined in 18 healthy human volunteers (15 men and 3 women, 21-63 yr old), by perfusion with isotonic solutions (275-285 milliosmoles/kg) containing cations and anions in concentrations which varied reciprocally between 0 and 150 mEq/liter, as well as glucose or mannitol, phenolphthalein as a nonabsorbable marker, and isotopically labeled sodium, potassium and water (D_2O). The position of the perfusing catheter was verified fluoroscopically, and reflux or contamination with natural secretions was prevented by a proximal occluding balloon. Isotonicity of the intestinal contents with plasma was consistently preserved, regardless of the composition of the perfusing fluid, but the ionic content of the perfusing solutions was changed in different ways in the ileum and jejunum. Net and unidirectional movements of Na, K and bicarbonate were related to their respective concentrations in the perfusate. Sodium was absorbed against concentration gradients and its movements had the characteristics of an active process, while transport of K followed electrochemical gradients. Movement of chloride was related most closely to the transport of water and sodium. Thus, the composition of the intestinal contents was altered in the direction of ionic equilibrium with the plasma. The most striking difference between jejunum and ileum was in the movement of bicarbonate, which was absorbed and secreted, resp., against high concentration gradients. In the jejunum, bicarbonate concentration was decreased and chloride increased in relation to their respective concentrations in the plasma, while in the ileum the bicarbonate was increased above plasma levels.

2754 **THE INTEGRITY OF THE STOMACH AS A REQUIREMENT FOR MAXIMAL IRON ABSORPTION.** *(E.)* Murray, M. J. (U. Minnesota Med. Sch., Minneapolis) and N. Stein. *J. Lab. Clin. Med.* 70(4):673-677, 1967.

In experiments on Sprague-Dawley rats, hemorrhage (daily bleeding from the tail until the hemoglobin reached 9 g%) or hemolysis (injection of phenylhydrazine, 30 mg/kg i.m.) was followed by a significant increase in the absorption of ^{59}Fe citrate from the stomach and intestines (0.25 μC administered intragastrically). This increase in Fe absorption was abolished by prior total gastrectomy or gastric freezing (-10C for 5 min), but not by a sham operation, indicating that the stomach, or at least a part of it, is required for maximal absorption of Fe in response to anemia. Iron absorption was 43.4% after a sham operation and hemolysis, compared to 3.9-4.9% after a sham operation or gastrectomy alone, and 5.3-6.1% after hemolysis or bleeding in gastrectomized rats. After gastric freezing (utilizing only rats in which there was no free HCl secretion), iron absorption after prolonged bleeding was only 5.4%. In view of the latter results, it is concluded that the effect of gastrectomy is not due to interruption of the continuity of the digestive tract, but to the elimination of gastric secretion. The gastric juice apparently contains a substance which potentiates the absorption of Fe under conditions of stress, although not being required for normal Fe absorption.

2755 **DAILY RHYTHMS IN THE CONCENTRATIONS OF VARIOUS AMINO ACIDS IN HUMAN PLASMA.** *(E.)* Wurtman, R. J. (Dept. Nutr. & Food Sci., Massachusetts Inst. Technol., Cambridge), C. M. Rose, C. Chou and F. F. Larin. *New Eng. J. Med.* 279(4):171-175, 1968.

The blood plasma collected at 3-6 hr intervals during the day and night from 23 healthy male volunteers (18-25 yr old) on diets containing varying amounts of protein (a "house diet" providing 1.5 g/kg, a "formula diet" providing 0.71 g of egg protein per kg, and a "low-protein formula diet" providing less than 0.04 g/kg) was assayed for 16 amino acids. A plasma tyrosine rhythm corresponding to the rhythmic fluctuations previously detected in the total amino acid concentration was detected in 22 of the 23 subjects. Among subjects receiving relatively large amounts of protein, the concentrations of tyrosine, phenylalanine and tryptophan tended to be lowest at 2:00 and highest at or after 10:30 a.m., while among subjects receiving the low-protein diet, the fluctuations in the plasma levels of these amino acids and methionine were similar except that peak levels were observed somewhat earlier in the morning. All the amino acids showed some tendency to vary during the day, the greatest relative changes being seen in the concentrations of tyrosine, tryptophan, phenylalanine, methionine, cysteine and isoleucine. The amino acids which account for most of the amino acid concentration of the blood (alanine, glycine and glutamic acid) showed the smallest variations.

2756 ASCORBIC ACID CHELATES IN IRON ABSORPTION: A ROLE FOR HYDROCHLORIC ACID AND BILE.

(E.) Conrad, M. E. (Walter Reed Army Inst. Res., Washington, D. C.) and S. G. Schade. *Gastroenterology* 55(1):35-45, 1968.

Preliminary *in vitro* studies showed that $FeCl_3$ forms a soluble iron chelate with ascorbic acid at acid pH's, which remains soluble after addition of NaOH, but forms an insoluble precipitate with ascorbate at alkaline pH's; $FeCl_2$, on the other hand, forms soluble complexes with ascorbate at all pH values. When pH-adjusted doses (pH 8.0) of the iron chelate and precipitate were administered intraduodenally to normal male albino rats or orally to gastrectomized animals, absorption of labeled iron was better from the chelate. When the preparations were administered orally to intact animals, however, there was no significant difference in Fe absorption since the precipitate was converted to a chelate by gastric acid. After chelation with ascorbic acid, the absorption of iron from $FeCl_3$ was equal to that from $FeCl_2$. Thus, the percent absorption of labeled Fe was 11.5% from oral $FeCl_2$, 8.9% from oral $FeCl_3$, 19.1% from oral $FeCl_2$-ascorbate, and 19.6% from oral $FeCl_3$-ascorbate in intact rats, 5.3% from oral $FeCl_3$-precipitate and 17.0% from oral $FeCl_3$-chelate in gastrectomized rats, and 4.1-4.5% from intraduodenal $FeCl_2$-ascorbate, 3.4% from intraduodenal $FeCl_3$-precipitate and 8.2% from intraduodenal $FeCl_3$-chelate in normal rats. The principal effect of ascorbic acid on absorption of iron from $FeCl_2$ is thus to increase its solubility at the alkaline pH of the duodenum. In rats made iron-deficient by bleeding followed by a powdered-milk diet, increased amounts of iron were still absorbed in the absence of bile or HCl, which may explain the slow development of relatively mild iron deficiency in achlorhydric or gastrectomized patients. Percent absorption of labeled Fe from intraduodenally administered compounds in Fe-deficient rats was 18.7-23.7% from $FeCl_2$-ascorbate, 31.7% from $FeCl_3$-precipitate, and 47.1% from $FeCl_3$-chelate. Ligation of the bile duct in normal rats decreased the absorption of Fe from test doses of $FeCl_3$ from 29.2% to 22.2%, but had little effect on absorption from $FeCl_2$. The effect of bile in promoting the solubility of $FeCl_3$ is also ascribed to its ascorbic acid content. It is concluded that gastric acid and bile act together to promote the formation of more readily soluble ferric iron complexes with dietary or biliary ascorbic acid. The ascorbic acid has a two-fold effect in that it is both an efficient chelating agent and a reducing agent, reducing ferric to ferrous iron and thus enhancing its duodenal absorption.

2757 QUANTITATIVE ASPECTS OF THE INTESTINAL ABSORPTION AND METABOLISM OF CHOLESTEROL AND β-SITOSTEROL IN THE RAT.

(E.) Borgström, B. (Div. Physiol. Chem., Chem. Ctr., U. Lund, Sweden). *J. Lipid Res.* 9(4):473-481, 1968.

Adult male Sprague-Dawley rats on normal, cholesterol-free or high-cholesterol diets were fed a single dose of radioactive cholesterol-4-^{14}C (1-50 μmoles/ml) and/or sitosterol-^{3}H (5-10 μmoles) in a known amount of triolein (nonradioactive or labeled with oleic acid-9,10-^{3}H) or oleic acid, and the mechanism of the intestinal absorption of nonglyceride fat was studied by analysis of the feces, intestinal contents, gastrointestinal mucosa and the liver. When increasing amounts of cholesterol were fed in a constant amount of triolein (200 μmoles), the percent absorbed decreased only very gradually and the total amount of cholesterol absorbed increased to a maximum. Only about 50% of dietary cholesterol was absorbed even at the lowest dose, and increasing the dose led to an increase of 1000-1500% in total absorption. The amount of cholesterol absorbed was higher when oleic acid was used as the carrier, indicating that solubility factors play a role, but the percent absorption of cholesterol was constant when a dose of 2 μmoles was given in increasing amounts of triolein (100-800 μmoles). Sitosterol, when fed in triolein, was absorbed only 10% as well as the corresponding dose of cholesterol. Intestinal transit studies indicated that the distinction between cholesterol and sitosterol, when fed together, takes place during uptake into the intestinal mucosa. Once taken up by the intestinal mucosal cell, the rates of outward transit for the two steroids were the same. Feeding sitosterol with cholesterol had essentially the same effect on cholesterol absorption as feeding the same additional dose of cholesterol. Previous feeding of high-cholesterol or cholesterol-free diets had no significant effect on cholesterol absorption, but absorption was practically abolished in rats with external biliary fistulas, confirming the role of the bile acids.

2758 RELATIONSHIP BETWEEN WATER AND SOLUTE TRANSPORT FROM ISOSMOTIC SOLUTIONS BY RAT INTESTINE *IN VIVO*.

(E.) Powell, D. W. (Walter Reed Army Med. Ctr., Washington, D. C.) and S. J. Malawer. *Amer. J. Physiol.* 215(1):49-55, 1968.

Net water and solute transport rates from an isosmotic electrolyte solution, with or without glucose, were determined in segments of the jejunum, ileum or colon of nonfasted, adult, male, anesthetized (sodium pentobarbital, 7 mg/100 g s.c.) Carworth-Farms albino rats, using an *in vivo* perfusion technique. Compared with the balanced electrolyte solution (glucose-free), water and total solute (osmolar) transport from the glucose electrolyte solution was 3 times as high in the jejunum, twice as high in the ileum, and the same in the colon. The increase in solute transport in the small intestine was due to glucose absorption and increased electrolyte absorption. Sodium absorption was increased 150%, accompanied mainly by increased chloride absorption in the jejunum and by a reversal of the direction of net CO_2 transport from secretion to absorption in the ileum. The relation between net water and net solute transport in the small intestine was the same from either of the two solutions. The calculated regression of net water transport on net solute transport, the progressive decrease in perfusate osmolality in the 3 segments, and the osmolarity of fluid transport as derived from mean water and solute transport rates support the conclusion that transport by more aboral segments of rat intestine becomes increasingly hypertonic. This could be explained by a gradient of membrane permeability (aboral decrease in pore size), in terms of the fluid-circuit theory of active water transport, or by proposed mechanisms of passive intestinal water transport. However, the zero intercept of the water: solute transport regression tends to rule out a fluid-circuit mechanism in its simplest form.

2759 GLUCOSE-GALACTOSE MALABSORPTION: A STUDY WITH BIOPSY OF THE SMALL INTESTINAL MUCOSA. *(E.)* Meeuwisse, G. W. (Dept. Physiol. Chem., U. Lund, Sweden) and A. Dahlqvist. *Acta Paediat. Scand.* 57(4):273-280, 1968.

The role of the glucose active transport system in glucose-galactose malabsorption was investigated in intestinal biopsy specimens of 2 patients, 16 months and 38 yr of age. Incubation studies with ^{14}C-labeled D-glucose and L-alanine were performed; disaccharidase, ATPase, and alkaline phosphatase activities, and the sodium activation of invertase were measured. Jejunal mucosa was histologically normal in both patients. Incubation of patients' intestinal mucosa revealed no glucose accumulation against a concentration gradient. Phlorizin did not further decrease the slow mucosal uptake of glucose. L-Alanine uptake and disaccharidase activity were normal. Sodium-induced invertase activity and ouabain-inhibited ATPase activity were demonstrated. Perfusion studies revealed glucose leakage into the lumen. Glucose-galactose malabsorption is thought to be localized at the level of the glucose-galactose membrane carrier of the small intestinal mucosa.

2760 EFFECT OF HYPOPHYSECTOMY ON FAT ABSORPTION IN THE RAT. *(E.)* Somkin, S. A. (New England Med. Ctr. Hosps., Boston, Mass.) and R. Levitan. *Amer. J. Dig. Dis.* 13(8):743-746, 1968.

Stool specimens collected from female Sprague-Dawley rats, 5 hypophysectomized and 4 controls, fed 6% and 30% fat diets for consecutive 10-day periods were analyzed for fat content by a modified Bligh and Dyer method to determine the effect of hypophysectomy on intestinal fat absorption. Fat intake and excretion were smaller in hypophysectomized animals than in normal controls on both diets. Since the data suggest that hypophysectomized animals absorb fat at least as efficiently as normal animals, the difference in fecal fat excretion between the 2 groups cannot be attributed to food intake alone.

2761 THE UPTAKE OF VITAMIN B_{12} BY *E. COLI*: POSSIBLE SIGNIFICANCE IN RELATION TO THE BLIND LOOP SYNDROME. *(E.)* Dellipiani, A. W. (Royal Infirmary, Edinburgh, Scotland), R. R. Samson and R. H. Girdwood. *Amer. J. Dig. Dis.* 13(8):718-726, 1968.

The effect of human gastric juice on vitamin B_{12} uptake by 4-hr cultures of *E. coli* was studied *in vitro* using ^{58}Co-labeled vitamin; bacterial uptake was measured 1 hr after incubation. In the absence of gastric juice, *E. coli* uptake of vitamin B_{12} was 80-90% after 1 hr; no significant increase resulted from prolonged incubation. Gastric juice had a marked inhibitory effect on the ability of the coliform to take up the vitamin, although inhibition was incomplete. The addition of nutrients at 1 and 5 hr incubation enabled organisms to take up vitamin B_{12} which gastric juice had earlier not made available to the organisms. Pepsin digestion caused significant loss of the vitamin B_{12} binding capacity of gastric juice; this loss is related to intrinsic factor activity loss. Trypsin and chymotrypsin have insignificant effects on gastric juice binding capacity. The findings support the hypothesis that abnormal gastrointestinal flora deprive man of vitamin B_{12} by direct competition.

2762 ABSORPTION OF LIPIDS FOLLOWING THORACIC DUCT OBSTRUCTION IN THE RABBIT. *(E.)* Sarles, H. (St. Marguerite Hosp., Marseille, France), H. Pietri, J. C. Sarles, R. Assadourian and M. A. Devaux. *Digestion* 1(1):22-26, 1968.

Fecal fat excretion was measured before and 1-9 months after thermocoagulation produced thoracic duct occlusion in 23 rabbits. Multiple biopsies of liver, pancreas, and intestinal mucosa were fixed and examined by light microscopy. The mean fecal fat excretion increased from 1.3 g/day before surgery to 2.8 g/day 4-9 months after surgery. The difference was statistically significant. There was progressive development of lymphangectasia, giving rise to lymphointestinal fistulas. Intestinal mucosa showed marked lymphatic dilatation in 19 experimental animals. No evidence of pancreas insufficiency, proposed by other investigators as accompanying lymphatic obstruction, was observed in microscopic studies.

2763 DETERMINATION OF RECTAL ABSORPTION BY NUCLEAR-MEDICAL METHODS. *(E.)* Ritter, U. (Med. Acad., Lubeck, Germany), H. Uthgenannt and L. Hesse. *Amer. J. Proctol.* 19(4):257-263, 1968.

Rectal absorptions of $^{14}C_1$ marked D-glucose in microclysms and ^{131}I in suppositories with various carrier substances were determined. The absorption of beta-emitters (^{14}C) was determined indirectly by measuring $^{14}CO_2$ in expired air. The absorption of gamma-emitters (^{131}I) was determined by activity in blood samples drawn at timed intervals after the application of the suppositories. There was no appreciable difference in the appearance of $^{14}CO_2$ in the expired air following i.v. injection as compared to the rectal application of 2 cc of $^{14}C_1$ labelled D-glucose. The rectal absorption of ^{131}I in cocoa butter reached values of 15-80% in 10 min, while the absorption of animal fat suppositories was 2.5-14% in 10 min. Based on these studies the clinical efficacy of suppositories is thought to vary considerably.

2764 INFLUENCE OF TEMPERATURE ACCLIMATIZATION ON THE TEMPERATURE-DEPENDENCE AND OUABAIN-SENSITIVITY OF GOLDFISH INTESTINAL ADENOSINE TRIPHOSPHATASE. *(E.)* Smith, M. W. (Agric. Res. Counc. Inst. Anim. Physiol., Babraham, Cambridge, England). *Biochem. J.* 105(1):65-71, 1967.

2765 THE CONTRIBUTION OF HYDROGEN BONDING AT C-6 TO THE ACTIVE TRANSPORT OF SUGARS IN HAMSTER INTESTINE. *(E.)* Jarvis, W. T. S. (Dept. Physiol., U. Southampton, England), J. E. G. Barnett and K. A. Munday. *Biochem. J.* 105(3):8P, 1967.

2766 THE PERSORPTION OF STARCH GRANULES. *(Rev.)(Ger.)* Volkheimer, G. (Charité Hosp., Berlin, Germany). *Stärke* 20(4):117-126, 1968.

2767 MECHANISMS FOR THE INTESTINAL ABSORPTION OF BILE ACIDS. *(Rev.)(E.)* Dietschy, J. M. (U. Texas Southwest. Med. Sch., Dallas). *J. Lipid Res.* 9(3):297-309, 1968.

2768 **ANION TRANSPORT BY ISOLATED RABBIT GALLBLADDERS.** *(E.)* Whitlock, R. T. (Columbia U. Coll. Phys. & Surg., New York City) and H. O. Wheeler. *Amer. J. Physiol.* 213(5):1199-1204, 1967.

2769 **AMMONIA ABSORPTION IN HAMSTER ILEUM: EFFECT OF pH AND TOTAL CO_2 ON TRANSPORT IN EVERTED SACS.** *(E.)* Mossberg, S. M. (Montefiore Hosp. & Med. Ctr., New York City). *Amer. J. Physiol.* 213(5): 1327-1330, 1967.

2770 **ACTIVE TRANSPORT OF Na^+ AND Cl^- BY *IN VITRO* NONSECRETING CAT GASTRIC MUCOSA.** *(E.)* Kitahara, S. (Dept. Physiol. Biophys., U. Iowa, Iowa City). *Amer. J. Physiol.* 213(4):819-823, 1967.

2771 **ABSORPTION OF LACTIC ACID FROM AN ISOLATED INTESTINAL SEGMENT IN THE INTACT RAT.** *(E.)* Heller, M. D. (U. Colorado Med. Ctr., Denver) and F. Kern Jr. *Proc. Soc. Exp. Biol. Med.* 127(4): 1103-1106, 1968.

2772 **STUDIES ON THE INHIBITION OF INTESTINAL ABSORPTION OF RADIOACTIVE STRONTIUM. VI. ALGINATE DEGRADATION PRODUCTS AS POTENT *IN VIVO* SEQUESTERING AGENTS OF RADIOACTIVE STRONTIUM.** *(E.)* Tanaka, Y. (Gastroint. Res. Lab., McGill U., Montreal, Quebec), S. C. Skoryna and D. Waldron-Edward. *Canad. Med. Ass. J.* 98(25):1179-1182, 1968.

2773 **ABSORPTION OF ANTIGENS FROM THE GASTROINTESTINAL TRACT.** *(E.)* Bernstein, I. D. (New York U. Sch. Med., New York City) and Z. Ovary. *Int. Arch. Allergy* 33:521-527, 1968.

2774 **WATER ABSORPTION FROM INTESTINE.** *(E.)* Curran, P. F. (Yale U. Sch. Med., New Haven, Conn.). *Amer. J. Clin. Nutr.* 21(7):781-784, 1968.

2775 **ELECTRIC POTENTIALS AND FLUID TRANSFER IN THE RAT INTESTINE.** *(E.)* Smyth, D. H. (Dept. Physiol., U. Sheffield, England). [Pp. 195-205 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2776 **ELECTROLYTE TRANSPORT AND VOLTAGE MEASUREMENTS IN A PREPARATION OF THE IRRADIATED RAT ILEUM.** *(E.)* McKenney, J. R. (Biol. Dept., Battelle Memorial Inst., Richland, Wash.) [Pp. 206-215 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2777 **THE MOVEMENT OF FLUID AND SOLIDS ACROSS THE MUCOSA OF VARIOUS SEGMENTS OF THE RAT INTESTINE PERFUSED WITH ISOTONIC AND HYPERTONIC SOLUTIONS OF SODIUM CYCLOHEXANESULFAMATE. (A SODIUM SALT WITH LOW PENETRABILITY).** *(Ger.)* Vogel, G. (Madaus Inst. Biol., Cologne, Germany) and I. Stoeckert. *Pflueger Arch. Ges. Physiol.* 301(1):76-90, 1968.

2778 **THE HUMAN COLON: ITS STUDY AND ABSORPTIVE FUNCTIONS.** *(E.)* Levitan, R. (Tufts U. Med. Sch., Boston, Mass.). *Israel J. Med. Sci.* 4(1): 140-145, 1968.

See also abstract nos.: 2702,3229

2779 ARTERIOVENOUS SHUNT MECHANISM IN GASTRIC SECRETION.

(E.) Zeppa, R. (U. Miami Sch. Med., Fla.), J. J. LaRosa and R. H. Bilbro. *Amer. J. Surg.* 115(2):185-190, 1968.

In intact anesthetized dogs (125 mg/kg chloralose i.v.), gastric acid secretion, gastric mucosal blood flow as determined by aminopyrine clearance, and the systemic arterial-gastric venous O_2 saturation difference all increased in parallel under the influence of histamine (2 μg/kg/min i.v.) and reached similar plateaus. The rise in A-V O_2 difference generally preceded the other effects by about 15 min. In anesthetized dogs which had been vagotomized several weeks before, histamine stimulation produced an increase in the A-V O_2 difference with no change in mucosal blood flow or gastric acid secretion. These results indicate that mucosal blood flow is increased by the closure of arteriovenous shunts, and that this mechanism is largely independent of the rate of gastric secretion. Simultaneous infusion of histamine and epinephrine (3.4 μg/kg/min) resulted in an increase in gastric acid secretion with a decreased A-V O_2 difference, suggesting that gastric secretion is, at least to some extent, independent of mucosal blood flow. Serotonin (20 μg/kg/min i.v.) had no effect on either gastric secretion or mucosal blood flow under the conditions of these experiments.

2780 EFFECT OF ANTRECTOMY ON GASTRIC ACID HYPERSECRETION INDUCED BY ISOLATION OF THE PROXIMAL SMALL BOWEL.

(E.) Kerr, G. (Ohio State U. Coll. Med., Columbus), D. W. Elliott and G. L. Endahl. *Amer. J. Surg.* 115(2):157-164, 1968.

In mongrel dogs of both sexes with denervated Heidenhain pouches still responsive to antral gastrin, exclusion of a large portion of the proximal small bowel by creation of a duodenojejunal Thiry fistula from 1 cm below the larger pancreatic duct to the midpoint of the small intestine resulted in significant hypersecretion of gastric acid, reaching 124-483% (average 287%) of baseline values. Excision of this same segment of small intestine, either immediately or following creation of the Thiry fistula, produced essentially the same levels of gastric hypersecretion (to 184-389%, average 281%, of baseline values), indicating that the effect is due to the elimination of an inhibitory factor originating in the small intestine. In dogs in which a Thiry fistula had been created 21 days earlier, antrectomy with Billroth I reconstruction radically decreased the secretion of gastric acid, to an average of only 32% of the baseline. In intact dogs, antrectomy was followed by a decrease in acid secretion to 7% of baseline; if this was followed 21 days later by creation of a Thiry fistula, acid secretion increased slightly (to 25% of baseline values), and this increase was abolished when the isolated segment of small intestine was later excised. These results suggest that the normal intestinal inhibition of acid secretion is directed against antral gastrin, but that significant lengths of defunctionalized small bowel are also able to release an acid-stimulating hormone. These findings are of significance in the surgical treatment of duodenal ulcer.

2781 POSTOPERATIVE CHANGES IN THE TRYPSIN INHIBITOR ACTIVITIES OF HUMAN PANCREATIC JUICE AND THE INFLUENCE OF INFUSION OF TRASYLOL ON THE INHIBITOR ACTIVITY.

(E.) Morgan, A. (Welsh Natl. Med. Sch., Cardiff, Wales), L. A. Robinson and T. T. White. *Amer. J. Surg.* 115(2):131-139, 1968.

In pancreatic juice obtained from the pancreatic ducts of 9 human subjects by a transduodenal drain after operations on the duodenum and sphincter of Oddi, as well as by direct transpancreatic puncture of the duct or trans-sphincteric cannulation in 4 other patients, the pancreatic trypsin inhibitor activity as determined by means of a pH stat technique with benzoyl arginine ethyl ester as the specific substrate was found to vary with time and to be markedly decreased in patients with pancreatitis or carcinoma obstructing the main duct.
A significant drop in inhibitor activity on the 1st postoperative day, probably in response to the surgical trauma, was followed by a gradual return to normal levels by the 4th day. In 4 patients, i.v. infusion of Trasylol (5000 or 50,000 units in 4 hr) was found to counteract this drop in inhibitor activity and thus contribute to the prevention of postoperative pancreatitis. The increase in inhibitor activity following Trasylol, which lasted about 24 hr, was the same at both dosage levels. In one patient, a 41-yr-old woman, the rise in trypsin inhibitor activity following Trasylol was accompanied by marked clinical improvement and clearing of the previously blood-stained pancreatic juice. In the discussion, Dr. J. J. Byrne reported the results of animal experiments, using the Pfeffer preparation, which indicated that the hemorrhagic pancreatitis produced by regurgitation of strangulated intestinal contents up the pancreatic ducts is due to a bacterial factor rather than a tryptic factor; this type of pancreatitis can be prevented by heparin or by sympathectomy of the celiac axis and superior mesenteric artery, but not by Trasylol (probably because enterokinase is also regurgitated up the duct).

2782 DIAZOXIDE AS A MODERATOR OF BILIARY FLOW AND A STIMULANT OF PANCREATIC SECRETION IN THE RAT.

(Fr.) Vaille, C. (Bichat Hosp., Fac. Med., Paris, France), C. Debray, J. de la Tour, C. Rozé and M. Souchard. *Arch. Int. Pharmacodyn.* 172(2):442-452, 1968.

In male Wistar rats anesthetized with urethan, a slow i.v. injection of 15 mg of diazoxide (3-methyl-7-chloro-1,2,4-benzothiadiazine) produced a significant increase in pancreatic secretion, returning to normal levels by the 3rd hr, and a prolonged decrease in biliary flow which was still only 30% of control values in the 3rd hr. The total protein and amylase output from the pancreas were also increased, since there was no significant change in protein concentration, but the bilirubin excretion was not significantly affected since there was a marked increase in the bilirubin concentration. Since diazoxide is known to produce decreases in blood pressure and urine volume together with marked increases in blood sugar, these results are of interest in relation to the effect of the exocrine secretion of the pancreas on blood sugar levels. The complex interrelations between insulin, secretin, blood pressure, blood sugar, biliary flow and drugs such as chlorothiazide, diazoxide and carbutamide are discussed with reference to the literature (33 refs.), and the conclusion is reached that the elucidation of the mechanism of these interactions will require further work.

2783 SULFATED GLYCOPROTEINS IN HUMAN GASTRIC JUICE. *(Fr.)* Martin, F. (Edouard Herriot Hosp., Lyon, France), R. Lambert, M. Martin, J. L. Vuez and A. Berard. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1): 5-14, 1968.

A sulfated-glycoprotein fraction was isolated from human gastric juice in a yield of 100 mg/liter by autoproteolysis for 48 hr at 37C followed by precipitation with cetyl-pyridinium chloride at pH 1.5 and purification with absolute alcohol and acetone. This fraction migrated homogeneously during paper electrophoresis in borate or acetate buffer. Fractional elution of the cetyl-pyridinium chloride complex, however, yielded 4 fractions elutable with 0.3N NaCl and 0.5, 0.6 and 0.8N $MgCl_2$, resp., which is ascribed to dispersion of either the molecular weight or the molecular charge. Chemical analysis of the sulfated glycoproteins revealed 28.5-30.2% hexosamines (probably N-acetyl glucosamine and galactosamine), 20.9-21.5% galactose, 10.2-13.6% fucose, 1.3-2.9% sialic acid, 0.5-0.7% uronic acid, 4.3-4.9% sulfate, 2.8-3.7% amino nitrogen, and 0.9-1.7% amino acid nitrogen. These analytical results clearly distinguish the sulfated glycoproteins from the sulfated polysaccharides of connective tissue, which are composed largely of glucuronic acid. The gastric mucoproteins were found to inhibit erythrocyte isoagglutination and the proteolytic action of pepsin. The hydrolysis of denatured hemoglobin by crystalline pepsin, for example, was inhibited 41-48% when the glycoprotein concentration was the same as that of hemoglobin (3.2 mg/ml). The physiological role of these glycoproteins in protecting the gastric mucosa against peptic digestion is discussed.

2784 EFFECTS OF SECRETIN IN STIMULATING THE OUTPUT OF AMYLASE AND LIPASE IN THE THORACIC DUCT OF THE DOG. *(E.)* Vega, R. E. (Hahnemann Med. Coll., Philadelphia, Pa.), H. E. Appert and J. M. Howard. *Ann. Surg.* 166(6):995-1001, 1967.

In experiments on fasting dogs anesthetized with pentothal, the i.v. injection of Boots secretin (95 units in 250 ml normal saline injected in 30 min) was followed by an immediate sharp increase in amylase and lipase levels in the thoracic duct lymph, and by smaller increases in these enzyme levels in the serum. There was no consistent relation between the serum and lymph concentrations of these enzymes during the control period; after secretin, however, lymph lipase was greater than serum lipase in 9 of 10 dogs, and lymph amylase was greater than serum amylase in 6 of 10. The average amylase concentration in the lymph increased in 11 of 12 dogs after secretin, from 3900 (range 1192-10,900) to 12,100 (range 1550-51,183) mg%, and the average lipase concentration increased in 8 of 12, from 0.8 (range 0.20-1.81) to 3.7 (range 0.42-11.81) U/ml. Secretin had no significant effect on thoracic duct flow, but the output of lymphatic amylase and lipase increased from 615 to 1715 mg/15 min and from 10.5 to 62.9 U/15 min, resp. The serum lipase also increased significantly after secretin in 9 of 10 dogs, from 0.24-1.53 to 0.30-3.86 U/ml, but the serum amylase increased in only 3 of 10 and decreased in 5 of 10. These results do not prove that the pancreas is the only source of these enzymes in the lymph, but they indicate that the demarcation between the exocrine and endocrine function of the acinar cells of the pancreas may not be as clear as previously believed. The possible physiological role of pancreatic enzymes in the lymph is discussed.

2785 ANTRAL ACIDITY AND GASTRIC SECRETION. *(E.)* Antinone, R. L. (Creighton U. Sch. Med., Omaha, Neb.), R. Bluvas and D. F. Magee. *Ann. Surg.* 166(6):990-994, 1967.

Experiments on conscious dogs with denervated gastric pouches demonstrated that the antral phase of gastric secretion is most active at a pH of 5.5-6.5, depending on the preparation and stimulus, and that a constant stimulus of any type yields progressively less acid and pepsin as the pH rises or falls from the optimum. There is therefore no pH threshold for antral inhibition of gastric acid secretion. Dogs were prepared with either a single fundic pouch or with two pouches, antral and fundic, produced by constructing a mucosal septum at the junction of the antral and fundic mucosae. Gastric acid and pepsin secretion was measured during stimulation by 5% peptone and acetylcholine at concentrations of 0.1-0.7%, or by 5% peptone and i.v. methacholine (2 μg/min) or gastrin (5 μg/min), while varying the pH between 3.0 and 8.0. With both i.v. and antral stimulation, gastric secretion showed a pH optimum of approximately 6.0. At pH levels between 3 and 8, acid secretion in response to intraantral acetylcholine rose progressively with acetylcholine concentrations from 0.1-0.5%, decreasing at 0.7%. It is suggested that there is probably a progressive decrease in gastrin release as the pH decreases below 5.5 or rises above 6.5, regardless of the stimulus. Acid inhibition of gastric secretion is therefore explained on the basis of pH-related changes in the sensitivity of the antral gastrin receptor.

2786 RELATIONSHIP BETWEEN DUODENAL pH AND PANCREATIC SECRETION IN DOGS AND PIGS. *(E.)* Hong, S. S. (Creighton U. Sch. Med., Omaha, Neb.), M. Nakamura and D. F. Magee. *Ann. Surg.* 166(5):778-782, 1967.

In conscious fasting dogs with a Thiry-Vella duodenal loop, low gastroenterostomy, and pancreatic and gastric fistulae, as well as in pigs prepared in essentially the same way, the volume of pancreatic secretion in response to secretin (0.5-1.0 U/min) was found to be directly proportional to the hydrogen ion concentration of solutions infused (at 2 ml/min for 20 min) into the duodenum; there was no threshold between a pH of 2.0 and 7.0, above which pancreatic secretion was inhibited. There was no change in amylase concentration, so that the amylase output paralleled the volume of pancreatic secretion. In pigs, both spontaneous and secretin-stimulated pancreatic secretion was inhibited by intraduodenal infusion of alkaline solutions, and especially by infusion of fresh pancreatic juice. The inhibitory effect of pancreatic juice, which persisted for about 30 min beyond the period of infusion, could not be accounted for by its alkalinity; the precise mechanism of this effect, however, remains unclear.

2787 THE ACTION OF SECRETIN ON THE SECRETION OF ENZYMES BY THE HUMAN PANCREAS. *(E.)* Wormsley, K. G. (Royal Infirm., Manchester, England). *Scand. J. Gastroent.* 3(2):183-188, 1968.

The pancreas trypsin response to continuous i.v. infusion of 0.25, 0.5, 1, 2, 5, 10 and 25 U/kg/hr of secretin was measured in duodenal aspirates collected at 10-minute intervals from 9 healthy subjects and 10 duodenal ulcer patients. The concentration of trypsin rose during the first 10 minutes of secretin stimulation and decreased during continuous infusion to a plateau level. The output plateau rose with increasing doses of secretin at low levels of stimulation; at higher dose levels, trypsin output decreased until it was no longer detectable in the aspirates. Much of the controversy concerning secretin's action is due to this biphasic pattern of response.

2788 STUDIES ON THE MECHANISM OF ACTION OF RESERPINE ON GASTRIC SECRETION.

(E.) Kaulbersz, J. (Med. Acad., Cracow, Poland) and J. Bugajski. *Acta Physiol. Pol. (Transl.)* 18(4):411-422, 1967.

In male dogs with Heidenhain pouches or gastric fistulas, and in cats with gastric fistulas, gastric acid and pepsin secretion was stimulated significantly by reserpine (0.5-1.5 mg i.v. in dogs, 0.1-0.2 mg i.m. in cats). This stimulation was not affected by denervation of the stomach, and resulted in maximal acid outputs of 1.85 mEq/hr in Heidenhain pouch dogs, 13.5 mEq/hr in gastric fistula dogs, and 0.7 mEq/hr in cats. Reserpine-induced stimulation of gastric acid secretion was almost totally abolished, however, by atropine (0.5-1.0 mg s.c. in dogs, 0.05-0.1 mg s.c. in cats), particularly in Heidenhain pouch dogs (74-94% inhibition), and was decreased significantly by the same dose of epinephrine in dogs (73% inhibition in Heidenhain pouch studies and 40-43% inhibition in dogs with gastric fistulas), but not in cats (17% inhibition). Since both gastric acid secretion and the response to reserpine were inhibited by serotonin (0.5-20 mg i.m. in dogs, 0.5-1.0 mg i.m. in cats), the reserpine effect could not be mediated via release of this chemical. In cats, reserpine-induced secretion was delayed by section of the right vagus, but not by section of the left vagus. Since reserpine stimulation produces a richer and more acid gastric juice than histamine stimulation, it is felt that the reserpine effect is mediated by both histamine and gastrin. In addition, a nervous component is apparently involved, at least in the initial stages of the reserpine effect.

2789 2-DEOXYGLUCOSE AND HISTAMINE EFFECTS ON GASTRIC MOTILITY AND SECRETION IN THE DOG.

(E.) Grahame, G. R. (U. Alabama Med. Ctr., Birmingham), J. M. Garrett and B. I. Hirschowitz. *Amer. J. Physiol.* 215(1):243-248, 1968.

The effects of central vagal stimulation of antral motility, using 25, 50 and 100 mg/kg of the glucose analog 2-deoxy-D-glucose (2-DG) and 0.08 mg/kg of atropine, and the role of histamine (6.25, 12.5, 25 and 50 μg/kg/hr) in motility were investigated in 5 healthy mongrel dogs with a Komarov esophagostomy and a gastric cannula proximal to the gastric antrum; the dogs were fasted 16 hr prior to the study but were permitted water *ad lib.* Gastric antral motility was measured by a water-filled balloon connected to a P 23 AC Statham strain gauge by polyethylene tubing. Type II motility (pressure waves greater than 5 cm of water) increased in each dog within 5-17 min of the onset of 2-DG infusion; secretion started at the same time as motility. Secretory volume, acid and pepsin outputs increased with 2-DG; only 1 of 3 dogs given 25 mg/kg of 2-DG showed increased motility and secretion, while all dogs responded to 50 mg/kg. Neither esophageal pressure nor motility changed with 2-DG. Atropine blocked the motility and secretory effects of 100 mg/kg of 2-DG; an abrupt cessation of motility and secretion was seen within 30 seconds of atropine administration after the stimulatory effects of 2-DG were well established for 1 hr. Two-hr histamine infusion increased volume and acid output, but did not effect pepsin secretion or motility. Histamine, given against a background of active 2-DG-induced motility, caused motility inhibition. The common factor controlling antral motility and gastric pepsin secretion appears to be vagal cholinergic in nature.

2790 THE SOURCE OF A GASTRIC SECRETORY INHIBITOR FROM HUMAN SALIVA. *(E.)*

Baume, P. E. (Inst. Med. Res., Royal North Shore Hosp. Sydney, Australia), C. H. Baxter and A. Nicholls. *Aust. Ann. Med.* 17(1):42-48, 1968.

This study was designed to test the ability of some human oral organisms to inhibit rat gastric acid secretion when injected intravenously, and to localize this inhibitory activity to a specific component of the bacterial cell. When the growth of salivary bacteria was prevented by collecting the saliva in jars containing penicillin, the saliva had no capacity to inhibit acid secretion. When saliva was collected over a 3-hr period without the use of antibiotics, however, the saliva did possess secretion-inhibiting activity. Human oral bacteria cultured in a saliva-free medium also possessed inhibitory activity. The 3 main oral bacteria studied (*Neisseria catarrhalis*, α-hemolytic *Streptococcus* spp., and *Lactobacillus casei*) were found to inhibit acid secretion to as much as 50% of control values when given in doses of 400-800 μg/kg body weight. The inhibitory activity was found to reside in the supernatant fraction of fragmented bacteria, which derives mainly from bacterial cytoplasm. Bacterial cell walls were entirely without inhibitory effect. Inhibition is probably due to a specific metabolic effect of a bacterial cell component, since experiments using liver cell preparations as an injected control show that inhibition is not due to the embolic effects of bacterial injection.

2791 REGULATION OF INSULIN SECRETION BY THE INTESTINAL HORMONE, SECRETIN: STUDIES IN MAN VIA TRANSUMBILICAL PORTAL VEIN CATHETERIZATION.

(E.) White, J. J. (Johns Hopkins Hosp., Baltimore, Md.) and J. Dupré. *Surgery* 64(1):240-213, 1968.

Glucose and insulin levels in the portal and systemic circulation after administration of glucose or secretin by various routes were determined by direct transumbilical catheterization in 15 fasted patients undergoing portal hepatography for suspected hepatic disease (cirrhosis, metastatic cancer). As expected, portal and systemic venous insulin levels increased sharply after oral administration of glucose (50-100 g), the response being greater than after i.v. administration into the portal vein or a peripheral vein (at a dose of 30 g in 20-40 min). Release of insulin into the splanchnic circulation was also stimulated by i.v. secretin (0.5-1.0 U/kg into the portal or a systemic vein), even though there was no detectable change in glucagon secretion. Insulin levels increased from 20 to 40 μU/ml in the peripheral veins and from 25 to 100 μU/ml in the portal vein after administration of secretin by either route. As a result, the blood sugar decreased in patients with hyperglycemia, although not in those with normal fasting levels. These results confirm previous findings that the high insulin levels after glucose ingestion depend upon alimentary function involving intestinal secretions, and indicate that secretin contributes to the stimulation of pancreatic endocrine secretion.

2792 FURTHER EXPERIMENTAL OBSERVATIONS ON THE GASTRIC ACID SECRETION INHIBITOR SC.15396. *(E.)* Gillespie, G. (West. Infirm., Glasgow, Scotland), V. I. McCusker, B. S. Bedi, H. T. Debas and I. E. Gillespie. *Gastroenterology* 55(1):81-87, 1968.

In 3 dogs with vagally-innervated pouches of the Jemerin-Hollander double mucosal septum type and 5 dogs with Heidenhain pouches, gastric acid secretion in response to either pentagastrin (15 μg/hr i.v.) or histamine acid phosphate (0.3-1.2 mg/hr i.v.) was found to be inhibited by large oral doses of SC.15396 [2-phenyl-2-(2-pyridyl)thioacetamide; 10 or 20 mg/kg in gelatin capsules], although the inhibition of pentagastrin-stimulated secretion was considerably more marked and longer lasting. Histamine-induced gastric secretion in vagally innervated pouches was also inhibited by 10 mg/kg of SC.15396 i.v., although a dose of 1 mg/kg had been shown earlier to be effective only against pentagastrin-stimulated secretion. When Heidenhain pouches were irrigated with 10 mg/kg of SC.15396 in dilute propylene glycol, there was no effect on the response to i.v. pentagastrin, indicating that the drug has no toxic effect on the acid-secreting mucosa and is not absorbed in significant amounts from the stomach. Instillation of SC.15396 (10 mg/kg) directly into the jejunum, however, produced the same inhibition of pentagastrin-stimulated secretion as oral administration. Oral SC.15396 (10-80 mg/kg given 30 min before a test meal of dog meat) also inhibited the secretory response to a meat meal, but significant inhibition was obtained only at the highest dose. These findings indicate that SC.15396 can inhibit gastric secretory responses to either gastrin or histamine, provided a sufficiently high dosage is used.

2793 MEISSNER'S PLEXUS AND THE MECHANISM OF VAGAL STIMULATION OF GASTRIC SECRETION. *(E.)* Kemp, D. R. (Coll. Med., U. Florida, Gainesville), F. Herrera-Fernandez, E. R. Woodward and L. R. Dragstedt. *Gastroenterology* 55(1):76-80, 1968.

The relationship between the extrinsic vagal innervation of the stomach and the possible activation of the parietal cells through the submucous Meissner's plexus was investigated in 4 mongrel dogs with gastric fistulas in which the gastric antrum was vagally denervated to exclude indirect vagal effects. Complete vagal denervation of the antrum did not reduce the gastric secretion induced by insulin hypoglycemia (maximum of 2.3-2.4 mEq/15 min 45 min after the administration of 0.15 U/kg). The secretory response to insulin was markedly decreased (to a maximum of 0.43 mEq/15 min 60-75 min after administration), although not completely abolished, by an additional circumferential incision around the stomach, about 5 cm below the esophagogastric junction, extending through the serosa and thus depriving the fundus and corpus of vagal innervation, but not disturbing Meissner's plexus. The changes in the volume of gastric secretion were similar to those in acid secretion. It is suggested that, if Meissner's plexus is activated by the vagus fibers entering the upper part of the stomach, it apparently does not convey this stimulation to all of the parietal cells in the lower parts. This does not explain why partial gastric vagotomy produces little or no decrease in basal hypersecretion in patients with duodenal ulcer. It is pointed out, however that the antrum was also deprived of vagus innervation in these experiments and that activation of the cephalic phase of gastric secretion by insulin hypoglycemia may not be entirely similar to that produced by feeding or by the mental and emotional stresses that operate in duodenal ulcer patients.

2794 ACID RESPONSES TO GRADED DOSES OF HISTAMINE AND GASTRIN IN HEIDENHAIN POUCH CATS. *(E.)* Emås, S. (Res. Dept., VA Ctr., Los Angeles, Calif.) and M. I. Grossman. *Gastroenterology* 55(1): 72-75, 1968.

The dose-response curves for gastric acid output in response to exogenous histamine and gastrin were determined in 3 conscious, adult, fasting cats with vagally denervated pouches of the oxyntic gland area constructed 3 weeks before. Basal acid secretion was 0 in 29 of 36 tests and was never more than 0.003 mEq/15 min; there was no response to 2-deoxyglucose. The dose-response curves to histamine (0.01-0.64 mg/kg/hr) and gastrin (0.05-3.20 g/kg/hr in terms of the wet weight of hog antral mucosa extracted) were parallel and essentially identical. The maximal mean acid output was 0.39 mEq/15 min in response to 0.32 mg/kg/hr of histamine and 0.41 mEq/15 min in response to 3.2 g/kg/hr of gastrin. Thus, the secretory response of the vagally denervated pouch in cats resembles that of the vagally denervated whole stomach, in contrast to the findings in dogs where the maximal response of a Heidenhain pouch (but not of the whole denervated stomach) to histamine is greater than that to gastrin.

2795 EFFECT OF ATROPINE ON ACID AND PEPSIN RESPONSES TO HISTAMINE IN CONSCIOUS MONKEYS. *(E.)* Rosato, E. F. (U. Pennsylvania Sch. Med., Philadelphia), G. P. Smith and F. P. Brooks. *Gastroenterology* 55(1):68-71, 1968.

In experiments on 5 conscious, fasting, male rhesus monkeys, weighing 3.5-5.2 kg and prepared with gastric and duodenal fistulae and a chronic indwelling polyethylene catheter in the superior or inferior vena cava, administration of atropine (1-3 mg) prior to a maximal (0.4-0.8 μg/kg/min) or supramaximal (twice the maximal dose) histamine infusion consistently inhibited both acid secretion (9-74% inhibition, average 33.4%) and pepsin secretion (25-67% inhibition, average 48.4%). When atropine was administered during histamine infusion, however, only the pepsin secretion was inhibited (0-70% inhibition, average 40.3%) while acid secretion was essentially unaffected (0-18% inhibition, average 5.9%). It is suggested that the failur of atropine to inhibit gastric acid secretion when administered during a maximal or supramaximal histamine infusion is due to steric hindrance by histamine at the muscarinic receptor sites of the parietal cells. It is also possible, however, that histamin has an effect on the distribution or metabolism of atropine. In addition to a cholinergic mechanism, histamine is believed to exert a direct effect on the parietal and chief cells of the gastric mucosa in the monkey.

2796 **ACID AND PEPSIN RESPONSE TO GASTRIN I, PENTAGASTRIN, TETRAGASTRIN, HISTAMINE, AND PENTAGASTRIN SNUFF.** *(E.)* Jepson, K. (U. Dept. Surg., Sheffield, England), H. L. Duthie, A. N. Fawcett, J. R. Gumpert, D. Johnston, J. Lari and K. G. Wormsley. *Lancet* 2(7560):139-141, 1968.

The gastric acid and pepsin responses to histamine (40 μg/kg), gastrin (2 and 4 μg/kg), pentagastrin (6 μg/kg), and tetragastrin (10 and 20 μg/kg) were compared in 4 normal subjects and in 1 vagotomized patient. Secretory stimulants were injected i.v., or, as in the case of pentagastrin, by intranasal insufflation. Stomach secretions were collected by nasogastric tube at 5-min intervals; volumes were measured, acid concentrations estimated by titration, and the pepsin concentration measured by the Hunt method. No consistent or significant difference in acid response was observed with the various stimulants. The pepsin secretory responses were greater with gastrin and histamine than with the other stimulants, although the differences were not statistically significant. The slightly alkaline gastrin solution caused local pain at the injection site, while no side-effects were observed with pentagastrin. Histamine produced the usual flush, and tetragastrin, due to the large volumes injected (up to 21 ml with the higher doses), caused sore legs in all subjects. Its safety and availability favor the use of pentagastrin; it can be satisfactorily used in the form of snuff if parenteral administration is contraindicated, or if sustained gastric stimulation is required.

2797 **MICROPUNCTURE STUDY OF PANCREATIC ELECTROLYTE SECRETION.** *(E.)* Reber, H. A. (U. Pennsylvania Hosp., Philadelphia) and C. J. Wolf. *Amer. J. Physiol.* 215(1):34-40, 1968.

Pancreatic electrolyte secretion was studied *in vivo* in fasted, male, New Zealand rabbits anesthetized with Dial-urethan, using an adaptation of the techniques for renal micropuncture, the technique is described in detail. Samples of pancreatic juice were collected simultaneously from the main duct and from ductules of the extralobular collecting system, from 58 to >400 μ in diameter, in order to compare the concentrations of chloride and bicarbonate. Under free-flow conditions, only one out of 19 samples showed a significant difference in bicarbonate concentration between main-duct and ductule juice, and there were no significant differences in chloride concentration. There were also no significant differences in chloride concentration when samples from ducts in which flow had been blocked for up to 1 min were compared with free-flowing pancreatic juice from the same ducts. The concentrations of chloride and bicarbonate in main-duct juice were 46.2-68.9 and 7.84-7.93 mEq/liter, resp. These experiments provide no evidence that the ducts of the extralobular collecting system play an active role in the secretion of bicarbonate or chloride.

2798 **OXYGEN CONSUMPTION DURING THIOCYANATE INHIBITION OF GASTRIC ACID SECRETION IN DOGS.** *(E.)* Moody, F. G. (U. Alabama Med. Ctr., Birmingham). *Amer. J. Physiol.* 215(1):127-131, 1968.

Histamine-stimulated (0.01-10 μg/min i.a.) acid secretion from exteriorized gastric segments of anesthetized (pentobarbital sodium) dogs showed a highly significant linear correlation (r = 0.83) with oxygen consumption, as calculated from the total blood flow and the arteriovenous difference in hemoglobin concentration and oxygen saturation. Each molecule of oxygen consumed resulted in the production of 2.7 mEq of acid. However, oxygen consumption continued at a high rate when acid secretion was inhibited by thiocyanate (0.5-2.0 mEq/min for 10-30 min i.v.). Thiocyanate also had no effect on total blood flow, as measured by a venous drainage technique, nor on the partition of the blood between the various gastric layers as measured by the distribution of ^{42}K (79-81% in the mucosa under all conditions). Aminopyrine clearance decreased sharply along with acid production, and is thus not a reliable index of mucosal blood flow during thiocyanate inhibition. The dissociation of respiration from gastric acid secretion under these conditions suggests that thiocyanate inhibits acid secretion at some point beyond the transfer of energy to the process.

2799 **INFLUENCE OF RESERPINIZATION ON THE GASTRIC SECRETION INDUCED BY PHYSOSTIGMINE AND PROSTIGMINE IN THE SHAY RAT.** *(E.)* Nakamura, M. (Fac. Med., Kyoto U., Japan), I. Ushiroda and K. Shimamoto. *Acta Med. Univ. Kioto* 40(1):13-24, 1967.

In male Wistar rats in which the pylorus had been ligated 30 min before, the i.p. injection of reserpine at a dose of 1 mg/kg produced a significant increase in the volume and acidity of the gastric juice secreted during the next 3.5 hr (measured by opening the stomach after sacrifice); a dose of 5 mg/kg, on the other hand, produced a definite decrease, while 3 mg/kg had a variable effect. Gastric secretion was also inhibited by physostigmine (5-50 μg/kg s.c., maximum at 10 μg/kg) and stimulated by prostigmine (25-50 μg/kg s.c.). In Shay rats to which reserpine (3 mg/kg i.p.) had been given 3 hr before surgery, both physostigmine and prostigmine inhibited gastric secretion, but when the same dose of reserpine was given 12-24 hr before surgery, both drugs (especially physostigmine), given 30 min after surgery as usual, stimulated gastric secretion. Reserpine alone (3 mg/kg) inhibited gastric secretion if given 3-6 hr before pyloric ligation and stimulated it if given 24 hr before pyloric ligation (variable effects at 12 hr). Examination of the gastric mucosa revealed no significant abnormalities after pyloric ligation alone or with reserpine. Combined treatment with reserpine and either physostigmine or prostigmine, however, produced hemorrhagic mucosal erosion and increased secretion of mucin. It is concluded that the inhibitory effect of physostigmine can be ascribed to adrenergic central nervous system stimulation which overrides the peripheral effects on the cholinergic mechanisms. Furthermore, both spontaneous gastric secretion and the secretory response to prostigmine are probably maintained or controlled by endogenous norepinephrine at sites in the central nervous sytem. Significant seasonal variation was observed in the gastric secretion in untreated control rats subjected to ligation of the pylorus, with a minimum volume (2.2-2.3 ml) and total acidity (20.01-21.78 mEq) in June-July and maxima in March and October (3.68-3.7 ml and 40.55-41.55 mEq) (no studies in the winter).

2800 GASTRIC MUCOSAL BLOOD FLOW AND ACID SECRETION IN CONSCIOUS ANIMALS MEASURED BY HEAT CLEARANCE. *(E.)* Bell, P. R. F. (West. Infirm., Glasgow, Scotland) and T. Shelley. *Amer. J. Dig. Dis.* 13(8):685-696, 1968.

Mucosal blood flow and acid secretion under the influence of histamine (0.5-2.0 μg/kg/min i.v.), pentagastrin (0.5-2.0 μg/kg/hr i.v.), antihistamine (Anthisan, 50 mg i.m.) and vasopressin (0.06-0.5 U/kg/hr) were measured simultaneously in 3 conscious gastric-fistula dogs before and after truncal vagotomy, using a heat-clearance technique which is based on the assumption that an increase in blood flow will be accompanied by an increase in thermal conductivity as measured by the heat loss from an electric heater in the stomach wall. Both histamine and pentagastrin produced increases in both gastric blood flow and acid secretion, whereas vasopressin decreased both blood flow and secretion. Anthisan, however, had no effect on acid secretion while producing a transitory rise in blood flow followed by a decrease. Vagotomy had no effect on the response to vasopressin, nor on the blood-flow response to histamine; acid secretion in response to histamine was sharply decreased after vagotomy, and both the blood-flow and acid-secretion responses to pentagastrin were moderately decreased. Control studies on anesthetized dogs are described in detail, and the advantages and disadvantages of the heat-clearance method are discussed. It is concluded that mucosal blood flow and acid secretion generally increase together, but not always in parallel. Thus, at submaximal stimulation, acid secretion can be increased without a further increase in blood flow, and although an increase in blood flow does not necessarily produce an increase in secretion, a sufficiently marked decrease in blood flow will always abolish both basal and stimulated acid secretion. Vagotomy has no long-term effect on the ability of the gastric mucosal circulation to respond to vasoactive drugs.

2801 DETERMINATION OF HISTAMINE DOSE CAUSING MAXIMAL GASTRIC SECRETION: STUDY IN RATS WITH GASTRIC FISTULAS. *(E.)* Kowalewski, K. (Surg.-Med. Res. Inst., U. Alberta, Edmonton, Canada) and G. Chmura. *Amer. J. Dig. Dis.* 13(8):753-761, 1968.

In male Sprague-Dawley rats with chronic gastric fistulas implanted 10 days before, histamine dihydrochloride was infused i.v. at doses of 5-2000 mg/kg in normal saline (100 ml/kg) over a 24-hr period and the total secretion of gastric acid and pepsin were measured. Control rats, also fasted for 24 hr before the experiment, received saline alone, preceded in one experiment by a single s.c. dose of histamine dihydrochloride at 0 time (100 mg/kg). The peak response in acid and pepsin output was obtained at 100 mg/kg/24 hr, due to a marked peak in the volume of gastric secretion (26.2 ml/day compared to 10 ml/day in controls, 12.7 ml/day after a single injection of histamine, and 15.6-19.7 ml/day during infusion of 10-75 or 125-2000 mg/kg/day). The maximal acid output was 3.15 mEq total HCl compared to 0.67 mEq in controls, 1.06 mEq after a single injection of histamine and 1.61-2.42 mEq at other dosages by infusion. The maximal pepsin output (expressed as mg tyrosine-like substances liberated from beef hemoglobin) was 527.1 mg compared to 146.1 mg in controls, 330.0 mg after a single injection of histamine and 282.397.9 mg at other dosages by infusion. The concentration of HCl and pepsin (110.8 mEq/liter and 17.7 mg/ml, resp.) was higher after histamine than in controls (66.2 mEq/liter and 14.4 mg/ml, resp.), but was essentially the same at all doses of histamine. The gastric parietal and chief cells showed no apparent fatigue during the 24-hr period, secretion continuing at a rate of about 0.7-1.09 ml/hr (0.06-0.09 mEq acid/hr) for the entire period; thus, 48.7-59.7% of the total acid and pepsin secreted were secreted during the 2nd 12-hr period. There were no effects on behavior and no systemic side effects, but all rats receiving 2000 mg/kg in 24 hr showed macroscopic lesions of the gastric mucosa (shallow ulcerations and submucosal hemorrhages in the rumen and glandular stomach).

2802 URINARY EXCRETION OF CALCIUM AND PHOSPHORUS FOLLOWING GASTRECTOMY. *(E.)* Birnbaum, D. (Hadassah U. Hosp., Jerusalem, Israel), J. Menczel and Z. Eyal. *Israel J. Med. Sci.* 4(1):151-154, 1968.

The effect of partial gastrectomy and jejunostomy on calcium and phosphorus absorption and excretion were investigated in 20 rats, 10 of which served as controls. Three to 4 weeks after surgery, the animals were fasted 18 hr and given 7 ml of physiological saline intragastrically. Later, 35 mg of calcium (as $CaCl_2$) was given in 7 ml of saline intragastrically; 4-hr urine specimens were collected from each animal. Creatinine determinations were also made. Calcium administration did not increase urinary volume in control animals; calcium excretion increased by 309%, and phosphorus excretion decreased by 62%. In gastrectomized rats, urinary output increased after the addition of calcium, but not significantly. Calcium excretion increased more than 3 times, while the expected decrease in phosphorus excretion was not observed. A comparison of the control and gastrectomized rats reveals a significant increase in urinary volume in gastrectomized animals. Normal saline did not significantly increase calcium excretion in gastrectomized rats when compared to control rats. Calcium administration significantly increased urinary excretion in gastrectomized animals over that of controls. No difference in creatinine output was seen under the different experimental conditions. There were significant differences in the Ca/P, Ca/creatinine, and P/creatinine ratios when calcium was administered. The findings suggest possible parathyroid hyperactivity occurring after gastrectomy.

2803 THE EFFECT OF SYNTHETIC SECRETIN ON THE EXTERNAL PANCREATIC SECRETION IN DOGS. *(E.)* Hendriksen, F. W. (Inst. Exp. Res. Surg., Copenhagen, Denmark). *Acta. Physiol. Scand.* 72(4):433-440, 1968.

Three fasted mongrel dogs (19-26 kg) with Thomas fistulas and gastrostomies were used to determine the effects of synthetic secretin on external pancreas secretion. Volume, bicarbonate and protein concentration were measured in pancreatic secretory samples. Pancreas secretion increased after secretin injection (0.25, 0.5, 1, 2, and 8U/kg of body weight); peak secretion was reached within the first and second 2-min collecting periods. Secretion declined with increasing doses of secretin. Bicarbonate concentration increased immediately after injection; peak concentration was reached between 3 and 11 min after stimulation, without any relation to the secretin dose used. Protein secretion increased above the non-stimulatory level within 2 min; there was no relation between protein secretion rate and dose of secretin. The increase in protein secretion is a "wash-out" phenomenon; smaller doses of secretin given with a continuous infusion failed to increase protein secretion. A significant increase in protein secretion rate was seen after 4 U/kg within 2 min, after which it returned to its basal level

804 **STUDY OF THE MAXIMAL ENZYMATIC SECRETORY CAPACITY OF THE NORMAL HUMAN PANCREAS DURING CONTINUOUS PERFUSION WITH SECRETIN AND PANCREOZYMIN.** *(Fr.)* Ribet, A. U. Hosp. Cent., Toulouse, France), J. P. Pascal and N. Sannou. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):91-92, 1968.

805 **EFFECT OF INSULIN ON THE RATE OF BIOSYNTHESIS OF PANCREATIC AMYLASE.** *Fr.)* Ben Abdeljil, A. (Inst. Biol. Chem., Fac. Sci., Marseille, France) and J. C. Palla. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1): 92-93, 1968.

806 **SECRETION OF SULFONATED GLYCOPROTEINS BY THE GASTRIC FUNDIC MUCOSA OF THE DOG.** *(Fr.)* de Graef, J. (St. Pierre U. Hosp., Brussels, Belgium), A. Gerard, R. Lev and G. B. J. Glass. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):88-89, 1968.

2807 **A PRELIMINARY STUDY OF EXTRAGASTRIC PEPSINOGENS.** *(Fr.)* Hirsch-Marie, M. H. (St. Antoine Hosp., Paris, France). *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):87-88, 1968.

2808 **EFFECT OF ANESTHETIC AGENTS ON MAXIMAL HISTAMINE-INDUCED GASTRIC SECRETION IN SHAY RATS.** *(E.)* Lee, Y. H. (U.C.L.A. Sch. Med., Los Angeles, Calif.) and J. H. Thompson. *Amer. J. Physiol.* 213(5):1331-1334, 1967.

2809 **CAN PSYCHIC STIMULATION CAUSE GASTRIC ACID SECRETION IN MAN?** *(E.)* Crawshaw, H. M. (U. Med. Sch., Edinburgh, Scotland), D. M. Fraser and T. S. Warrender. *Lancet* 2(7559):66-68, 1968.

2810 **HISTOENZYMOLOGICAL STUDY OF THE EXOCRINE PANCREAS OF THE FASTING DOG AFTER INTRAVENOUS INFUSION OF SECRETIN AND A SINGLE INJECTION OF PANCREOZYMIN.** *(Fr.)* Frexinos, J. (Purpan Hosp., Toulouse, France), R. Fedou and A. Ribet. *Rev. Med. Toulouse* 4(5):357-368, 1968.

2811 **PHYSIOLOGICAL STUDIES ON EXTERNAL PANCREATIC SECRETION IN MAN.** *(E.)* Baker, R. J. (Dept. Surg., U. Illinois Coll. Med., Chicago), W. C. Shoemaker and E. L. Strohl. *Bull. Soc. Int. Chir.* 27(2): 81-88, 1968.

2812 **EFFECT OF DIETARY CARBOHYDRATES ON INTESTINAL DISACCHARIDASES IN GERM-FREE AND CONVENTIONAL RATS.** *(E.)* Reddy, B. S. (Dept. Microbiol., U. Notre Dame, Indiana), J. R. Pleasants and B. S. Wostmann. *J. Nutr.* 95(3):413-419, 1968.

2813 **EFFECTS OF DIETARY NIACIN CONCENTRATION AND PROTEIN CONTENT ON GASTRIC ACIDITY AND VITAMIN B_{12} BINDING CAPACITY OF GASTRIC MUCOSA IN RATS.** *(Jap.)* Koyanagi, T. (Tohoku U., Sendai, Japan) and S. Yamada. *Tohoku J. Exp. Med.* 94(1):63-69, 1968.

2814 **INSULIN INHIBITION OF GASTRIC SECRETION: REVERSAL BY RUBIDIUM.** *(E.)* Hirschowitz, B. I. (U. Alabama Med. Ctr., Birmingham) and G. Sachs. *Amer. J. Physiol.* 213(6):1401-1405, 1967.

2815 **ROLE OF PYLORIC ANTRUM IN CHOLERESIS AFTER INSULIN AND FEEDING.** *(E.)* Jones, R. S. (Sch. Med., U. Pennsylvania, Philadelphia) and F. P. Brooks. *Amer. J. Physiol.* 213(6):1406-1408, 1967.

2816 **THE EFFECT OF HYPERBARIC OXYGEN ON THE UPPER GASTRO-INTESTINAL SECRETIONS.** *(E.)* Caridis, D. T. (U. Aberdeen, Scotland), P. E. G. Mitchell, J. N. Norman and G. Smith. *Brit. J. Surg.* 55(2): 103-105, 1968.

2817 **BICARBONATE SECRETION IN RAT ILEUM AND ITS DEPENDENCE ON INTRALUMINAL CHLORIDE.** *(E.)* Hubel, K. A. (U. Iowa, Iowa City). *Amer. J. Physiol.* 213(6):1409-1413, 1967.

2818 **EFFECT OF NERVE STIMULATION ON PROSTAGLANDIN FORMATION AND RELEASE FROM THE RAT STOMACH.** *(E.)* Coceani, F. (Montreal Neurol. Inst., McGill U., Canada), C. Pace-Asciak, F. Volta and L. S. Wolfe. *Amer. J. Physiol.* 213(4):1056-1064, 1967.

2819 **THE ROLE OF THE VAGUS IN THE ANTRAL RESPONSE TO FOOD.** *(E.)* DeCastella, H. (St. Mary's Hosp., London, England) and W. T. Irvine. *Brit. J. Surg.* 54(10):828-831, 1967.

2820 **THE CLINICAL APPLICATION OF GASTRIC ACID SECRETION STUDIES.** *(E.)* Abernethy, R. J. (Western Infirm., Glasgow, Scotland). *Brit. J. Surg.* 54(10):859-862, 1967.

2821 **THE RELATIONSHIP BETWEEN LIVER BLOOD-FLOW AND THE GASTRIC SECRETORY RESPONSE INDUCED BY HISTAMINE.** *(E.)* Schofield, P. F. (Royal Infirm., Manchester, England), G. Ingram and H. B. Torrnace. *Brit. J. Surg.* 54(11):931-934, 1967.

2822 **THE INFLUENCE OF DIETARY FAT ON CANINE GASTRIC SECRETION.** *(E.)* Landor, J. H. (Royal Postgrad. Med. Sch., London, England), P. W. Davis and R. B. Welbourn. *Brit. J. Surg.* 54(11):961-964, 1967.

2823 **THE INTESTINAL PHASE OF GASTRIC SECRETION.** *(Por.)* Juacara, H. *Hospital* 73(5):1387-1392, 1968.

2824 **INFLUENCE OF REAGENTS REACTING WITH METAL, THIOL AND AMINO SITES ON CATALYTIC ACTIVITY AND L-PHENYLALANINE INHIBITION OF RAT INTESTINAL ALKALINE PHOSPHATASE.** *(E.)* Fishman, W. H. (Tufts U. Sch. Med., Boston, Mass.) and N. K. Ghosh. *Biochem. J.* 105(3):1163-1170, 1967.

See also abstract nos.: 2697,3180,3194

825 **STUDIES ON HUMAN INTESTINAL PRO-
TEOLYSIS.** *(E.)* Goldberg, D. M. (Western
nfirm., Glasgow, Scotland), R. A. McAllister and A. D. Roy.
cand. J. Gastroent. 3(2):193-201, 1968.

eal drainage material collected from 5 ileostomy patients
eated for ulcerative colitis and polyposis coli was weighed,
omogenized with 4 volumes of saline and analyzed for total
roteolytic activity (TPA); aliquots of the homogenates were
entrifuged and the supernatants analyzed also. TPA estima-
on was based on the hydrolysis of a buffered protein solution
nd measurement of acid-soluble digestion products. The re-
tionship between TPA and dietary fat, carbohydrate and pro-
ein was studied 24 hours after diet stabilization. Only protein
gnificantly affected TPA, increasing it by 37.4% when the
ietary protein level was raised from 40 to 90 g/day; this ef-
ct was observed only in the whole homogenates. TPA was
reater at night in 2 subjects whose ileal contents were mea-
ured every 6 hours for 8 days. Neomycin sulfate (8 g/day),
iven orally, reduced TPA output by 12% in the homogenates
nd increased it by 1.3% in the supernatants; the differences
ere not statistically significant. Fecal output was not a reliable
uide to ileal TPA output or pancreatic output. The human
nall intestine was found to be capable of digesting several kg
f protein daily. Estimates of TPA in ileal or duodenal homog-
nates is a convenient measurement of pancreatic enzyme ac-
vity and provides more useful information than measurement
f any single enzyme.

826 **INTESTINAL DIPEPTIDASES. DIPEP-
TIDASE ACTIVITES IN HUMAN INTESTINAL
UICE.** *(E.)* Josefsson, L. (Dept. Physiol. Chem., U. Lond,
weden), T. Lindberg and L. Ojesjö. *Scand. J. Gastroent.*
(2):207-210, 1968.

ntestinal juice, collected at various levels in 4 intubated nor-
nal subjects 22-23 yr of age, was analyzed for dipeptidase
ctivities using L-alanyl-L-glutanic acid, L-alanyl-L-proline,
nd glycyl-L-leucine as substrates. Only L-alanyl-L-proline
ipeptidase activity was observed in jejunal fluid, while all
dipeptidase activities were present in the ileal aspirates.
elating activities to nitrogen content, activity against L-
lanyl-L-glutamic acid and glycyl-L-leucine was found to be
nly 1-2% of amounts previously reported from intestinal,
ucosa while L-alanyl-L-proline dipeptidase activity in the
uice was more similar to that of mucosa cells. These findings
re inconsistent with the previously reported conception that
ipeptidase activities in intestinal juice originate from epith-
lial cell debris, since it is known that no difference exists
the release of various dipeptidases from mucosal samples *in vitro* although of different enzymes. The low activities found do not support an important role for the intestinal content in peptide hydrolysis.

2827 **ANTICHOLINERGIC DRUG ACTION ON PANCREATIC EXOCRINE OUTFLOW IN MAN AND DOG.** *(E.)* Schapiro, H. (U. Tennessee Med. Units, Memphis), L. D. Wruble, J. W. Estes, R. Sherman and L. G. Britt. *Amer. J. Dig. Dis.* 13(7):608-614, 1968.

In 40 studies on 6 fasting unanesthetized dogs surgically prepared for the collection of pancreatic juice, the effect of graded doses of atropine and oxyphenonium on pancreatic flow stimulated either by single i.v. injections of secretin (1 unit/kg body weight) or by a continuous drip of 0.1 N HCl onto the duodenal mucosa was determined. In 10 studies on a single patient with a bilateral vagotomy, partial gastrectomy, and an external pancreatic fistula, the effect of atropine and propantheline on basal and on continuous secretin-stimulated pancreatic outflow was also determined. In 5 dogs whose pancreatic exocrine outflow was stimulated by HCl drip, the i.v. injection of atropine, 0.005 mg/kg, caused a 41-52% inhibition of flow, while atropine, 0.1 mg/kg, caused a 94-97% inhibition of flow. Control studies with i.v. saline showed no effect on pancreatic flow. In the patient with the external pancreatic fistula, atropine, 0.01-0.02 mg/kg, caused a 47-64% reduction in basal flow and propantheline 0.3 mg/kg, caused a 63-68% reduction in basal flow. When the pancreatic exocrine flow in the dogs was stimulated by the secretin injection, atropine, 0.005-1.0 mg/kg inhibited the pancreatic outflow 0-38%, and oxyphenonium 0.5-1.0 mg/kg, inhibited the pancreatic outflow 5-9%. Pancreatic flow, stimulated by the continuous secretin infusion in the patient with the external pancreatic fistula, was reduced 0-18% by atropine, and was reduced 12% by propantheline. These data suggest that a very sensitive cholinergic mechanism is operating to release secretin when HCl is infused into the small bowel, and that very small doses of anticholinergic drugs may block the release of secretin, while very large doses can only partially block the action of secretin once it is released.

2828 **MEAN TURNOVER TIMES OF FIVE HYDROLASES IN THE PANCREAS OF NORMAL RATS AND RATS WITH MALNUTRITION.** *(Fr.)* Vandermeers, A. (Fac. Med. Pharm., U. Brussels, Belgium), M. H. Khayat, J. Rathe and J. Christophe. *Biochim. Biophys. Acta* 158(3):448-455, 1968.

MOTILITY

2829 **HORMONAL CONTROL OF INTESTINAL MOTILITY.** *(E.)* Hiatt, R. B. (Coll. Phys. Surg., Columbia U., New York City), I. Goodman and A. Alavi. *Ann, Surg.* 166(4):704-711, 1967.

The role of the posterior pituitary in the inhibitory control of intestinal motility was studied in dogs using a new type of Roux-en-Y jejunal preparation (end-to-side jejunojejunostomy) associated with a constant state of mild intestinal excitation. Motility was recorded by means of intraluminal plastic balloons. Comparative studies on synthetic lysine vasopressin, synthetic arginine vasopressin, synthetic oxytocin, pitressin, pituitrin, and fractions obtained by cellulose and Sephadex column fractionation of crude bovine posterior pituitary acetone powder revealed several fractions with inhibitory activity and one, in particular, with a molecular weight of about 12,000 and a cephalocaudad integrative capacity which is evidenced by neither the other posterior pituitary preparations nor the catecholamines. Given i.v., the inhibitory activity of this fraction is 10 times that of epinephrine on a weight basis and 500 times higher on a molar basis. This substance, the purification of which by disc electrophoresis is still in progress, seems to control intestinal pacemaker activity. The regulatory role of the posterior pituitary on intestinal motility was also confirmed by a preliminary therapeutic trial of crude pitressin (average dose of 0.2 μg s.c. twice daily) in 24 patients with intestinal motor derangements (spastic constipation, ileismus, malfunctional ileostomies, ulcerative colitis, regional enteritis) and/or diarrhea; improvement was obtained in 20, and pitressin was also found to increase fluid absorption. These effects are ascribed to an impurity rather than to the vasopressin content. In a review of the excitatory and inhibitory mechanisms which control intestinal motility, it is pointed out that the intestine is highly automatic, due to the myenteric plexus, and that an increase in motility can be produced either by an increase in excitation (such as by serotonin) or by a decrease in inhibition. The results of animal experiments suggest that the posterior pituitary plays an important role in the biological control of intestinal motility and absorption *in vivo.*

2830 **GASTRIC PRESSURES RECORDED BY A TELEMETERING CAPSULE.** *(E.)* Silverstone, J. T. (U. Pennsylvania Sch. Med., Philadelphia), G. P. Smith and A. J. Stunkard. *Amer. J. Dig. Dis.* 13(7):615-618, 1968.

This study was stimulated by an earlier report of the failure to find a relationship between reports of hunger and gastric motility, due in part to a very low frequency of Type II gastric pressure waves (approximately 1.2/hr) when the sensor was alone in the stomach. A much higher frequency was recorded when a balloon was also used to monitor gastric pressures. This suggested that the higher frequency was an artifact produced by the presence of the balloon. In this study, a small-bore, open-tipped catheter system was used instead of a gastric balloon. The same telemetering system was used as in the earlier study. Studies were performed on 4 healthy men aged 22-43 years. Two experiments were randomly performed on each subject. Gastric pressures were recorded by the capsule alone; and in the other experiment, gastric pressures were also recorded by the catheter. Subjects remained supine for the 4-hr study, after an overnight fast. The sensor remained in the stomach during the entire experiment. Type II pressure waves recorded by the sensor occurred at a rate of 14/hr, regardless of the presence or absence of the catheter. The differences in this study when compared to the earlier study may have been due to slight differences in procedure concerning the time of day the study was performed, the duration of the pre-trial fasting period, and the position of the subjects.

2831 **ELECTROMYOGRAPHIC STUDIES OF ESOPHAGEAL MOTILITY.** *(Fr.)* Hellemans, J. (St. Raphael Acad. Hosp., Louvain, Belgium), J. Janssens and G. Vantrappen. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):86, 1968.

2832 **BARIUM STIMULATION OF ESOPHAGEAL SMOOTH MUSCLE.** *(E.)* Christensen, J. (Dept. Int. Med., U. Iowa Coll. Med., Iowa City). *Proc. Soc. Exper. Biol. Med.* 128(1):109-112, 1968.

2833 **MANOMETRIC AND ELECTROMYOGRAPHIC STUDIES ON THE EFFECT OF TRANSECTION OF CANINE STOMACH ON THE PYLORIC MOTOR FUNCTION.** *(Jap.)* Shiratori, T. (Tohoku U. Sch. Med., Sendai, Japan), T. Okabayashi, K. Sugawara and N. Harata. *Tohoku J. Exp. Med.* 94(1):69-81, 1968.

2834 **MOVEMENT OF DISCRETE PARTICLES IN THE 100- TO 200-MICRON DIAMETER RANGE THROUGH THE GASTROINTESTINAL TRACT OF LABORATORY ANIMALS AND MAN.** *(E.)* Richmond, C. R. (Biomed. Res. Group, Los Alamos Sci. Lab., New Mexico) and J. E. Furchner. [Pp. 498-509 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2835 **INVESTIGATIONS ON GASTROINTESTINAL TRANSIT TIMES.** *(E.)* Karhausen, L. (French Atomic Energy Commission, Fontenay-aux-Roses, France) and H. Glatzel. [Pp. 510-517 in Gastrointestinal Radiation Injury: Report of a Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

2836 **THE PASSAGE TIME OF PLUTONIUM OXIDE IN PIGS.** *(E.)* Smith, V. H. (Biol. Dept., Battelle Memorial Inst., Richland, Washington), H. A. Ragan, B. J. McClanahan, J. L. Beamer and J. L. Palotay. [Pp. 518-523 in Gastrointestinal Radiation Injury: Report of A Symposium at Richland, Washington, 25-28 Sept 1966. M. F. Sullivan, Ed. (Monographs on Nuclear Medicine and Biology, No. 1). Excerpta Medica Foundation, 1968. 542 pp.]

See also abstract nos.: 2789,2972

2837 **GLUCURONIDE CONJUGATION OF PHTHALEIN DYES BY THE LIVER: A STUDY IN WISTAR AND HOMOZYGOUS GUNN RATS.** *(Fr.)* Dhumeaux, D. (Beaujon Hosp., Clichy, France), P. Berthelot and R. Fauvert. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):37-47, 1968.

The hepatic metabolism of 3 phthalein dyes (uranin or sodium fluorescein, phenol red, and tetrachlorofluorescein) was studied in adult male Wistar rats. Chromatographic analysis and treatment of samples of bile with β-glucuronidase showed that these dyes are all conjugated by the liver, but that the reaction is markedly inhibited by sulfonic acid and halogen substituents. After the i.v. injection of equimolar amounts of uranin and phenol red, 82.5-83.3% of the former and 16.6-18.6% of the latter were present in the bile in conjugated form. The biliary excretion in 90 min amounted to 47.9-55.9% of the amount administered for uranin and 16.6% for phenol red. When the administration of uranin was preceded by novobiocin (8.1 µM/100 g i.v.), the amount excreted in the bile was significantly reduced (to 30.4%), but the proportion conjugated was still 84.4%. In homozygous Gunn rats with unconjugated hyperbilirubinemia of 54-78 mg/liter, which is generally ascribed to congenital glucuronyl transferase deficiency, 57.5% of the uranin entering the bile was still conjugated in the liver and 36% of a dose of 9.3 µM/100 g was excreted in the bile in 90 min. This result, in the absence of significant bilirubin conjugation, could be explained either by the presence of two different but genetically related glucuronyl transferases, one acting on uranin and the other on bilirubin, or by the presence of a single glucuronyl transferase with variable substrate affinity.

2838 **SYNTHESIS OF SERUM AND SUB-CELLULAR LIVER CHOLESTEROL ESTERS IN FASTED AND FED RATS.** *(E.)* Swell, L. (VA Hosp., Richmond, Va.) and M. D. Law. *J. Nutr.* 95(2):141-147, 1968.

Chromatographic analysis of the liver and serum cholesterol esters 45-180 min after administration of cholesterol-4-^{14}C (10 µC in serum i.v.) in both fasted (deprived of food for 18 hr) and fed male Wistar rats revealed marked heterogeneity in the labeling of the cholesterol esters in the liver cell fractions and serum. In both fasting and fed rats, the soluble fraction ^{14}C-esters contained a higher proportion of ^{14}C-arachidonate than the particulate liver fractions. Fasting rats showed a higher percentage of ^{14}C-arachidonate in the liver cell fractions and serum cholesterol esters than fed rats. There were also comparable differences in the fatty acid composition of the cholesterol esters. The differences in distribution of radioactivity and cholesterol ester fatty acid composition were principally at the expense of the mono-unsaturated esters. The specific activity of the esters in the liver cell fractions exceeded that of the corresponding esters in the serum. In both serum and liver, cholesterol arachidonate showed the highest fractional turnover rate. The data suggest that there is a compartmentalization of cholesterol ester metabolism in the liver, and that the liver is the major source of the serum esters. The types of cholesterol esters synthesized in the liver and released into the blood also seem to depend on the nutritional status of the animal.

2839 **EFFECT OF ALTERATIONS IN PROTEIN INTAKE ON LIVER XANTHINE DEHYDROGENASE IN THE CHICK.** *(E.)* Scholz, R. W. (Dept. Animal Sci., Purdue U., Lafayette, Ind.) and W. R. Featherston. *J. Nutr.* 95(2):271-277, 1968.

In 10-day-old White Rock cockerels, a switch from a diet containing 25% isolated soybean protein to one with 75% isolated soybean protein for 10 days resulted in no significant difference in body weight, liver weight, or the response of these parameters to a 24-hr fast, but produced a significant increase in the liver xanthine dehydrogenase activity. This increase was demonstrated whether the enzyme activity was expressed in terms of U/g (61.6 vs. 29.1), U/100 mg N (185.9 vs. 100.8), U/liver (819.1 vs. 365.0), or U/100 g body weight (229.3 vs. 103.0). It was also demonstrated by both colorimetric and spectrophotometric determinations of xanthine dehydrogenase activity (based on residual xanthine and rate of formation of NADH, resp.). The decrease in liver nitrogen during a 24-hr fast was also greater in chicks on the high-protein diet. In most cases, a 24-hr starvation period did not significantly lower the total liver xanthine dehydrogenase, but feeding a protein-free diet for 24 hr resulted in significantly lower xanthine dehydrogenase levels. The increase in xanthine dehydrogenase on a high-protein diet is interpreted as an adaptive response designed to contribute to the maintenance of homeostasis.

2840 **EXCRETION OF BROMSULPHALEIN AND DEPLETION OF HEPATIC GLUTATHIONE IN THE RAT.** *(E.)* Edwards, K. D. G. (Kanematsu Mem. Inst., Sydney Hosp., Australia), N. B. Javitt, H. O. Wheeler and S. E. Bradley. *Aust. Ann. Med.* 17(2):118-126, 1968.

In experiments on nonfasting, male, Sherman albino rats, a single i.v. injection of BSP (0.2 µmole/g) was found to produce a significant transient drop (from 7.8 to 5.5 µmole/g 60 min after the injection) in the concentration of glutathione in the liver. Minimal glutathione concentrations were observed at 45-75 min, when most of the BSP had been excreted. At the same time, the glutamic acid concentration in the liver rose significantly (from 3.3 to 4.1 µmole/g). In studies on fasting rats, a continuous i.v. infusion of BSP at 0.48 µmole/min for an average time of 3 hr also resulted in a drop in liver glutathione (from 6.2 to 3.6 µmole/g). Prior treatment with cysteine increased the liver glutathione content and prevented its depletion after injection of BSP. Chemical studies of the major BSP conjugate, either synthesized *in vitro* or isolated from rat bile, revealed conjugation of BSP and glutathione in a 1:1 ratio. Autoradiography of paper chromatograms of bile obtained after administration of ^{35}S-labeled glutathione, followed 10 min later by i.v. injection of BSP, revealed a diversion of radioactivity from the usual metabolites of glutathione to the BSP conjugates. It is concluded that depletion of hepatic glutathione by BSP is due to its removal from the liver cells by conjugation, followed by excretion into the bile, not to decreased synthesis or increased catabolism. On the contrary, the rate of synthesis of hepatic glutathione may be increased after injection of BSP, and catabolism by the usual pathways appears to be decreased.

2841 **EFFECT OF MALNUTRITION ON ACTIVITY OF TWO ENZYMES CONCERNED WITH AMINO ACID METABOLISM IN HUMAN LIVER.** *(E.)* Stephen, J. M. L. (Trop. Metab. Res. Unit, U. West Indies, Jamaica) and J. C. Waterlow. *Lancet* 1(7534):118-119, 1968.

The effects of protein malnutrition on amino acid activating enzymes were evaluated in 22 malnourished infants, 7-21 months of age; liver biopsy specimens were taken 7-10 days after antibiotic and parenteral electrolyte therapy, 1 month after the first biopsy, and 1-2 months after the second. Argininosuccinase activity, representative of the urea enzyme cycle, was measured in 11 patients. Amino acid activating enzyme levels increased initially and then fell after recovery; argininosuccinase was initially low and rose on recovery. No relation was found between enzyme activities and clinical characteristics, such as edema, hepatomegaly, rate of weight gain or loss at the time of biopsy. The results show that the nutritional state or the level of protein intake influences the activities of enzymes concerned with amino acid metabolism.

2842 **REGENERATION OF THE MAMMALIAN LIVER: VI. RETENTION OF PHENOBARBITAL–INDUCED CYTOPLASMIC ALTERATIONS IN DIVIDING HEPATOCYTES.** *(E.)* Becker, F. F. (New York U. Sch. Med., New York City) and B. P. Lane. *Amer. J. Path.* 52(1):211-225, 1968.

The purpose of these experiments was to examine further the relationship of cytoplasmic differentiation to the ability of the hepatocyte to prepare for and participate in a cell division cycle. Hyperdifferentiated hepatocytes were produced by the i.p. administration of phenobarbital (a single dose of 100 mg/kg or 60 mg/kg twice daily) into Sprague-Dawley male rats prior to 70% hepatectomy. Control animals received an equivalent volume of saline. Phenobarbital caused a progressive increase in O-demethylase activity at all drug doses and a proliferation of agranular endoplasmic reticulum (AER). Following 70% hepatectomy the level of O-demethylating activity per unit of liver mass was not significantly less than in sham-operated rats. Large aggregates of AER were noted in the cytoplasm of hepatocytes containing mitotic figures. Both morphologic and chemical data suggest that the hepatocyte can prepare for and participate in cell division while retaining extreme functional specialization.

2843 **EFFECT OF DIETARY COMPOSITION OF AMINO ACID ON GROWTH AND LIVER HISTIDASE AND ALANINE TRANSAMINASE OF RAT.** *(E.)* Noda, K. (Sch. Med., Tokushima U., Japan) and A. Yoshida. *Tokushima J. Exp. Med.* 14(1-2):33-43, 1967.

2844 **A STUDY OF THE LACTATE:PYRUVATE RATIO AND OF INTERMEDIARY CARBOHYDRATE METABOLISM IN LIVERS PERFUSED AFTER PRESERVATION.** *(Fr.)* Chapuis, Y. (Broussais Hosp., Paris, France), J. P. Lenriot and L. Leger. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):93-94, 1968.

2845 **EFFECT OF HYPOPHYSECTOMY ON THE METABOLISM OF ESSENTIAL FATTY ACIDS IN RAT TESTES AND LIVER.** *(E.)* Jensen, B. (U. Minnesota), M. Nakamura and O. S. Privett. *J. Nutr.* 95(3):406-412, 1968.

2846 **MESSENGER RIBONUCLEIC ACID STABILITY IN RAT PANCREAS AND LIVER.** *(E.)* Cozzone, A. (Inst. Biol. Chem., Fac. Sci., Marseille, France) and G. Marchis-Mouren. *Biochemistry* 6(12):3911-3917, 1967.

2847 **METABOLISM OF [1-^{14}C]GLYOXYLATE, [1-^{14}C]GLYCOLLATE, [1-^{14}C]GLYCINE AND [2-^{14}C]GLYCINE BY HOMOGENATES OF KIDNEY AND LIVER TISSUE FROM HYPEROXALURIC AND CONTROL SUBJECTS.** *(E.)* Dean, B. M. (St. Bartholomew's Hosp., London, England), R. W. E. Watts and W. J. Westwick. *Biochem. J.* 105(2):701-707, 1967.

2848 **STUDIES ON GLYCOGEN SYNTHESIS IN PIGEON LIVER HOMOGENATES: GLYCOGEN SYNTHESIS FROM GLUCOSE MONOPHOSPHATES AND URIDINE DIPHOSPHATE GLUCOSE.** *(E.)* Nigam, V. N. (Cancer Inst., Montreal, Quebec, Canada). *Biochem. J.* 105(2):515-519, 1967.

2849 **STUDIES ON GLYCOGEN SYNTHESIS IN PIGEON LIVER HOMOGENATES: INCORPORATION OF HEXOSE INTO GLYCOGEN.** *(E.)* Nigam, V. N. (Cancer Inst., Montreal, Quebec, Canada) and A. Fridland. *Biochem. J.* 105(2):505-513, 1967.

2850 **SUBCELLULAR DISTRIBUTION OF CYTOCHROME C IN RAT LIVER: METHODS FOR ITS EXTRACTION AND PURIFICATION.** *(E.)* González-Cadavid, N. F. (Middlesex Hosp. Med. Sch., London, England) and P. N. Campbell. *Biochem. J.* 105(2):427-442, 1967.

2851 **LACK OF UPTAKE AND METABOLISM OF THE TRIGLYCERIDE OF SERUM LIPOPROTEINS OF DENSITY LESS THAN 1.006 BY THE PERFUSED RAT LIVER.** *(E.)* Mayes, P. A. (Dept. Physiol., Roy. Vet. Coll., London, England) and J. M. Felts. *Biochem. J.* 105(1):18C-20C, 1967.

2852 **DEMONSTRATION AND PARTIAL CHARACTERIZATION OF MULTIPLE FORMS OF BOVINE LIVER β-GLUCURONIDASE.** *(E.)* Plapp, B. V. (Dept. Biochem., U. California, Berkeley) and R. D. Cole. *Biochemistry* 6(12):3676-3681, 1967.

2853 **GLUCONEOGENESIS FROM VARIOUS PRECURSORS IN NEONATAL RAT LIVER.** *(E.)* Vernon, R. G. (Dept. Biochem., U. Birmingham, England), S. W. Eaton and D. G. Walker. *Biochem. J.* 105(3):15P, 1967.

2854 **THE EFFECT OF REDUCED NICOTINAMIDE-ADENINE DINUCLEOTIDE AND PREINCUBATION IN OXYGEN ON THE ANAEROBIC GLYCOLYSIS OF LIVER AND HEPATOMA.** *(E.)* Ragnotti, G. (Inst. Gen. Path., U. Milan, Italy), F. Cajone and G. Gaja. *Biochem. J.* 105(3):47C-48C, 1967.

2855 **ACETYLCHOLINESTERASE ACTIVITY IN THE SURFACE MEMBRANE OF RAT LIVER.** *(E.)* Wheeler, G. E. (Dept. Med. Biochem., U. Birmingham, England), R. Coleman and J. B. Finean. *Biochem. J.* 105(3):5P, 1967.

2856 **BIOCHEMICAL PROPERTIES OF INNER AND OUTER MITOCHONDRIAL MEMBRANES OF LIVER.** *(E.)* Sottocasa, G. L. (Inst. Biol. Chem., U. Trieste, Italy). *Biochem. J.* 105(3):1P-2P, 1967.

2857 **CONVERSION OF 3β-HYDROXYCHOLEST-5-EN-26-OIC ACID INTO BILE ACIDS *IN VIVO*.** *(E.)* Mitropoulos, K. A. (Med. Res. Council, Hammersmith Hosp., London, England), P. D. G. Dean, M. W. Whitehouse and N. B. Myant. *Biochem. J.* 105(3):31P-32P, 1967.

2858 **ANALYSIS OF THE CANALICULAR PHENOMENA DURING BILIARY SECRETION.** *(Fr.)* Chenderovitch, J. (St. Antoine Hosp., Paris, France). *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):97, 1968.

2859 **UTILIZATION OF NATIVE PRIMER BY MAMMALIAN LIVER GLYCOGEN SYNTHETASE: PRIMER EFFICIENCY IN BINDING THE ENZYME AND IN CATALYSIS.** *(E.)* Vardanis, A. (Res. Inst., Canada Dept. Agric., London, Ontario). *Canad. J. Biochem.* 46(6): 579-581, 1968.

2860 **INCREASED HEPATIC SYNTHESIS OF CHOLESTEROL AFTER ILEAL BY-PASS IN MONKEYS.** *(E.)* Moutafis, C. D. (Hammersmith Hosp., London, England) and N. B. Myant. *Clin. Sci.* 34(3):541-548, 1968.

2861 **BILIARY EXCRETION AND ENTEROHEPATIC CIRCULATION OF ESTRONE AND ESTRIOL IN RODENTS.** *(E.)* Sandberg, A. A. (Roswell Park Mem. Inst., Buffalo, N. Y.), R. Y. Kirdani, N. Back, P. Weyman and W. R. Slaunwhite Jr. *Amer. J. Physiol.* 213(5):1138-1142, 1967.

2862 **LIVER MICROSOMAL INORGANIC PYROPHOSPHATE–GLUCOSE PHOSPHOTRANSFERASE: ALTERATIONS IN ACTIVITY–pH PROFILES BY CORTISONE *IN VIVO*.** *(E.)* Nordlie, R. C. (U. N. Dakota Med. Sch., Grand Forks), J. R. Gilsdorf, R. N. Horne and R. J. Paur. *Biochim. Biophys. Acta* 158(1):157-159, 1968.

2863 **INFLUENCE OF SEVERAL DRUGS ON THE *IN VIVO* AND *IN VITRO* ACTIVITY OF MAMMALIAN HEPATIC AZO-REDUCTASE.** *(E.)* Burba, J. V. (Food & Drug Directorate Res. Labs., Ottawa, Canada). *Canad. J. Biochem.* 46(4):367-371, 1968.

2864 **VITAMIN C STORAGE IN THE LIVER.** *(E.)* Giedosz, B. (Krakow Med. Acad., Poland). *Acta Physiol. Pol.* 18(4):479-481, 1967.

2865 **BILE SALT EVOLUTION.** *(E.)* Haslewood, G. A. D. (Guy's Hosp. Med. Sch., London, England). *J. Lipid Res.* 8(6):535-550, 1967.

2866 **THE ORIGINS OF BILIRUBIN.** *(E.)* Robinson, S. H. (Harvard Med Sch., Boston, Mass.). *New Eng. J. Med.* 279(3):143-149, 1968.

2867 **LIVER HYPERTROPHY, LIVER GLYCOGEN ACCUMULATION, AND ORGAN-WEIGHT CHANGES IN RADIOTHROIDECTOMIZED AND GOITROGEN-TREATED CHICKS.** *(E.)* Snedecor, J. G. (U. Massachusetts, Amherst). *Gen. Comp. Endocr.* 10(3):277-291, 1968.

2868 **FORMATION OF BILE ACIDS IN MAN: CONVERSION OF CHOLESTEROL INTO 5β-CHOLESTANE-3α,7α,12α-TRIOL IN LIVER HOMOGENATES.** *(E.)* Bjorkhem, I. (Karolinska Inst., Stockholm, Sweden), H. Danielsson, K. Einarsson and G. Johansson. *J. Clin. Invest.* 47(7):1573-1582, 1968.

2869 **PROBLEMS IN THE REGULATION OF HEPATIC METABOLISM. I. BASIC PRINCIPLES IN THE REGULATION OF METABOLIC PROCESSES.** *(Rev.)(Ger.)* Holldorf, A. W. (Inst. Biochem., U. Freiburg i. Br., Germany), E. Förster and H. Falk. *Acta Hepatosplen. (Stuttgart)* 15(3):129-141, 1968.

2870 **EFFECT OF SOME STEROIDS WITH PROTEOANABOLIC ACTIVITY ON PROTECTIVE SYNTHETIC REACTIONS IN THE LIVER.** *(It.)* Di Toro, R. (Inst. Clin. Pediat., U. Naples, Italy), L. Rascio and G. Stoppoloni. *Epatologia* 13(5):1137-1148, 1967.

2871 **METABOLIC CONTROL IN ISOLATED RAT LIVER CELLS.** *(E.)* Terranova, T. (Sch. Med., Catholic U. Sacred Heart, Rome, Italy), S. Baldi, T. Galeotti and G. Neri. *Epatologia* 13(5):935-946, 1967.

2872 **CHANGES IN LIVER XANTHINE DEHYDROGENASE AND URIC ACID EXCRETION IN CHICKS DURING ADAPTATION TO A HIGH PROTEIN DIET.** *(E.)* Featherston, W. R. (Purdue U., Lafayette, Indiana). *J. Nutr.* 95(3):393-398, 1968.

2873 **HEPATIC RNA METABOLISM IN MALE AND FEMALE OBESE RATS FED CHOLESTROL.** *(E.)* Fillios, L. C. (Boston U. Sch. Med., Mass.) and O. Yokono. *J. Nutr.* 95(3):349-356, 1968.

2874 **SHIFTS IN BILE LIPID COMPOSITION DUE TO PARTIAL EXTERNAL BILIARY DRAINAGE.** *(It.)* Calandra, S. (Inst. Clin. Gen. Med. & Ther., U. Modena, Italy), G. Salvioli, P. Ferrari and L. Mariani. *Fegato* 13(4): 479-488, 1967.

2875 ***IN VITRO* METABOLISM OF TESTOSTERONE IN THE RAT LIVER: 1. CONJUGATION OF TESTOSTERONE IN THE CARBON TETRACHLORIDE INJURED LIVER.** *(Jap.)* Obara, K. (Iwate Med. Coll., Morioka, Japan), N. Sato and M. Ota. *Med. Biol.* 76(4):159-162, 1968.

2876 **SELECTIVE INHIBITION OF RIBOSOMAL RNA SYNTHESIS BY LEVORPHANOL IN LIVER**

See also abstract nos.: 3150,3482,3483

CELLS. *(Jap.)* Sakiyama, S. (Med. Sch. Chiba U., Japan). *J. Jap. Biochem. Soc.* 40(5):214-219, 1968.

2877 **EFFECTS OF ALKYLDIHYDROXYBENZOQUINONE DERIVATIVES ON THE SWELLING OF RAT LIVER MITOCHONDRIA.** *(Jap.)* Ozawa, H. (Tohoku U. Sch. Med., Sendai, Japan) and K. Momose. *J. Jap. Biochem. Soc.* 40(2):52-58, 1968.

2878 **STUDIES ON THE EFFECT OF PORPHYRINOGENIC AGENT (DDC) ON HEPATOMA CELLS.** *(Jap.)* Matsuoka, K. (Nagoya U. Sch. Med., Japan). *J. Jap. Biochem. Soc.* 40(2):59-68, 1968.

2879 **PURIFICATION AND PROPERTIES OF VALYL-T RNA SYNTHETASE FROM RAT LIVER.** *(Jap.)* Yoshida, S. (U. Nagoya, Japan). *J. Jap. Biochem. Soc.* 40(1):16-23, 1968.

2880 **NUCLEAR PHOSPHOLIPIDS IN RAT LIVER DURING COMPENSATORY HYPERTROPHY.** *(Fr.)* Bornens, M. (Ctr. for Res. on Normal & Cancer Cells, Natl. Ctr. Sci. Res., Villejuif, Paris, France). *Bull. Soc. Chim Biol.* 50(3):591-619, 1968.

2881 **FRACTIONATION OF THE LIVER MICROSOMES IN THE RAT. I. BIOCHEMICAL PROPERTIES AND ENZYMATIC ACTIVITY OF THE SUBFRACTIONS OBTAINED IN A DENSITY GRADIENT.** *(Fr.)* Decloitre, F. (Ctr. for Res. on Normal & Cancer Cells, Natl. Ctr. Sci. Res., Villejuif, Paris, France) and J. Chauveau. *Bull. Soc. Chim. Biol.* 50(3):491-504, 1968.

2882 **SYNTHESIS IN LIPID METABOLISM.** *(Por.)* Kamel, D. and Vaissman, I. *Hospital* 73(5): 1445-1452, 1968.

2883 ***IN VIVO* DIALYSIS OF FAECES AS A METHOD OF STOOL ANALYSIS. III. THE EFFECT OF INTESTINAL ANTIBIOTICS.** *(E.)* Wilson, D. R. (Royal Postgrad. Med. Sch., London, England), T. S. Ing, A. Metcalfe-Gibson and O. M. Wrong. *Clin. Sci.* 34(1):211-221, 1968.

The chemical composition of fecal dialysate, prepared by allowing healthy adult volunteers (3 men and 2 women, 28-41 yr old) to ingest dialyzing capsules daily with their normal diet, was found to be affected by the oral administration of antibiotics. A combination of neomycin (6 g/day), bacitracin (120,000 U/day), nystatin (3,000,000 U/day) and either colistin sulfate (4,500,000 U/day) or polymyxin B sulfate (4,000,000 U/day), administered for 3-6 days, resulted in the consistent appearance of urea in concentrations close to or slightly higher than normal plasma levels (0-11.6, av. 5.1 mmoles/liter), along with significant decreases in the ammonia concentration (from av. 11.2 to 7.4 mmoles/liter) and the osmolality (from av. 357 to 304 milliosmoles/kg). These results indicate that bacterial activity in the colon is normally responsible for the absence of urea, for much of the ammonia, and for the slight hyperosmolality of fecal extracellular fluid. Other changes in the fecal dialysate following administration of antibiotics included a drop in pH (from 6.96 to 6.63), an increase in the Na/K ratio (from 0.25 to 0.48), an increase in the diffusibility of both nitrogen and potassium, increased phosphate and total nitrogen, and decreases in potassium, chloride, calcium and magnesium. The stools were softer and more bulky than normal, which may have contributed to some of these changes, but there was no diarrhea. In 2 of 3 subjects tested, neomycin (6 g/day for 6 days) or paromomycin (4.8 g/day for 6 days) alone caused changes similar to those produced by the antibiotic mixture. In the 3rd subject, however, neither antibiotic suppressed intestinal urea-splitting microorganisms sufficiently to produce detectable concentrations of urea in the fecal dialysate.

2884 **SERUM ALCOHOL DEHYDROGENASE, AN INDICATOR OF INTRAHEPATIC CHOLESTASIS.** *(E.)* Mezey, E. (St. Luke's Hosp. Ctr., New York City), G. R. Cherrick and P. R. Holt. *New Eng. J. Med.* 279(5):241-248, 1968.

Serum alcohol dehydrogenase activity was measured spectrophotometrically by a modified Bonnichsen-Brink method 2 or 3 times weekly in 266 fasting hepatic and nonhepatic disease patients to evaluate the potential clinical application of the enzyme assay in liver diagnosis. No serum alcohol dehydrogenase activity was detected in normal subjects. Only 1 patient with nonhepatic disease showed an elevated enzyme level; this patient had heart failure with congestive hepatomegaly. Elevated enzyme levels were noted in acute parenchymal liver-cell damage from viral, toxic, or anoxic causes. Six of 76 patients with viral hepatitis had detectable alcohol dehydrogenase activity, late in the course of the disease; patients with uncomplicated viral hepatitis showed elevated activity for a maximum period of 3 weeks after jaundice onset. Elevated serum enzyme levels were detected in 7 out of 9 chronic active hepatitis patients. None of the 24 patients with postnecrotic cirrhosis had raised enzyme levels. Nine patients with intrahepatic cholestasis had elevated alcohol dehydrogenase activity; enzyme levels returned to normal with relief of stasis. Alcohol dehydrogenase acticity was undetectable in 37 out of 40 patients with jaundice secondary to extrahepatic biliary obstruction; massive hepatocellular necrosis associated with extensive portal and hepatic vein radicle invasion and blockade by carcinomatous metastasis was observed in 2 out of the 3 patients with elevated enzyme levels, while the other had choledocholithiasis and gangrenous cholecystitis. One patient with Hodgkin's disease with intrahepatic stasis had elevated alcohol dehydrogenase activity; none of the patients with miscellaneous hepatic diseases, including carcinomas, granulomas, and mononucleosis with hepatic involvement had abnormal enzyme levels. This assay reflects the extent of liver-cell damage, while being a reliable index of intrahepatic cholestasis and a valuable aid in the differential diagnosis of intrahepatic and extrahepatic biliary obstruction.

2885 **GASTRIC CYTOLOGY.** *(E.)* Withers, K. L. (Inst. Clin. Path. Med. Res., Dept. Publ. Hlth., Lidcombe, New South Wales, Australia), B. J. Way and S. Miller. *Med. J. Australia* 1(14):588-589, 1968.

Gastric lavage, performed on 146 patients with gastric symptoms and, in most cases, radiological abnormalities between July, 1965 and the end of 1966, revealed 17 cases of cancer, 14 of the stomach and 3 of the esophagus. This number included no false positives, although 4 patients had been thought to have benign ulcers; 3 cases of stomach cancer were missed by cytology. Of these 3, one yielded a clump of atypical cells which indicated the need for a second lavage, one had multiple gastric polyps, one of which had undergone malignant change, and one had an advanced, ulcerated, mucoid adenocarcinoma. In contrast, radiological examination yielded 5 false negatives and 4 false positives, and in 6 of 20 and 23 of 91 cases, resp., the radiological findings were "suspicious" rather than unequivocally positive or negative. It is suggested that gastric cytology, in combination with other techniques, may be valuable in detecting more cases of early operable carcinoma.

2886 **GASTRIC CYTOLOGY: 12 MONTHS OF INITIAL EXPERIENCE OF ITS USE AS AN AID IN DIAGNOSIS.** *(E.)* Hackett, E. (Queen Elizabeth Hosp., Woodville, South Australia), A. K. Grant and J. A. Kirkland. *Med. J. Australia* 1(14):590-591, 1968.

Among 71 consecutive gastric cytological examinations carried out between July, 1965 and July, 1966, 14 were positive for gastric carcinoma and 57 were negative; 2 other patients could not pass the collecting tube. Based on the results of radiology (73 patients) and gastroscopy (62 patients), as well as autopsy or laparotomy findings and clinical course, 12 of the 14 positive diagnoses were correct, including 2 cases in which the results of radiology and gastroscopy, resp., were negative and the surgical specimen resembled gastric ulcer; 50 of the 57 negative diagnoses were also correct. The 2 false positives were also diagnosed as cancer by X-ray, but gastroscopy was negative. Among the 7 false negatives, all diagnosed correctly by X-ray, 4 had extensive fungating carcinomas which apparently do not readily exfoliate malignant cells, and a 5th was of the linitis plastica type with no mucosal invasion. In contrast, gastric radiology yielded 20 false positives and 3 false negatives. The results of gastroscopy were positive for cancer in 17 of 62 cases (including 6 false positives) and negative in 45 of 62 (including 5 false negatives). It is concluded that gastric cytology is of value in confirming the benign nature of a gastric lesion which has been demonstrated by X-ray, or in assessing the significance of a radiological finding of malignancy. It is not recommended for the routine screening of the population for gastric malignancy.

2887 **_IN VIVO_ MEASUREMENTS OF THE GASTROINTESTINAL TRACT: HIATUS HERNIA AND ACHALASIA.** *(E.)* Meredith, J. H. (Bowman Gray Sch. Med., Winston-Salem, N. C.), H. H. Bradshaw and L. C. Smith. *Amer. Surg.* 33(12):927-930, 1967.

The pH in the upper gastrointestinal tract was determined by means of a Beckman pH electrode in 28 patients with physiological or anatomical disturbances or symptoms referable to the gastroesophageal junction. Among 15 patients with symptomatic hiatus hernia but no esophagitis or stricture, 3-5 showed abnormally low pH values in the esophagus (low values presumably due to reflux in 11 cases during the Valsalva maneuver) and one had an abnormally high pH in the stomach. Among 4 patients with hiatus hernia and esophagitis, 1-2 had low esophageal pH values. Both patients with esophagitis in the absence of hiatus hernia had a low esophageal pH (but normal gastric pH), and 5 patients with neither hiatus hernia nor esophagitis (2 of whom had idiopathic symptoms) all had normal pH values. One patient with achalasia showed a low esophageal pH (4.2 in the distal esophagus at the aortic arch and 3.1 in the lower esophagus). One patient with esophagitis and achlorhydria had a pH of 6.42-6.7 in the esophagus, even during a Valsalva maneuver, and a pH of 6.3 in the stomach. It is concluded that low esophageal pH values are more often associated with esophagitis than with hiatus hernia alone. Determinations of the esophageal pH may be useful in patients with symptoms of esophageal reflux or esophagitis in whom no hernia can be demonstrated, patients with hiatus hernia and no esophagitis, and postoperative patients with persistent symptoms but no recurrence of herniation.

2888 **RADIOISOTOPIC ASSESSMENT OF CIRCULATION AND CIRCULATORY DYNAMICS IN THE SMALL INTESTINE.** *(E.)* Wright, P. W. (Harbor Gen. Hosp., Torrance, Calif.). *Amer. Surg.* 33(10):801-806, 1967.

Preliminary experiments have demonstrated the feasibility of a radioisotopic method for the study of the small intestinal circulation in intact subjects which monitors the local circulation of a radiation source in the blood, in a segment of bowel wall, by means of a small, specially designed detector positioned in the intestinal lumen. The method relies upon a pure beta-emitting isotope confined to the circulating blood ($Cr^{32}PO_4$ or ^{32}P-labeled red cells injected i.v.) and a small, sensitive, semisolid-state scintillation detector probe (a lithium-ion-drift, semiconductor, nuclear particle detector) suitable for incorporation in the tip of a Miller-Abbott tube positioned in the jejunal lumen. Due to the properties of the beta radiation from ^{32}P, the activity recorded by the detector depends exclusively on blood perfusing a shallow depth of intestinal wall surrounding the counter. In these studies, 18 dogs under pentobarbital anesthesia were subjected either to hypervolemia induced by blood transfusion (10 ml/kg) or to a reduction of superior mesenteric artery blood flow (produced by partial constriction and measured by means of a flowmeter in the superior mesenteric artery). After transfusion, which increased the blood volume by an average of 12.5% and the superior mesenteric artery flow by 11-23%, the recorded radioactivity decreased by an average of 9.1%, which is interpreted as an increase in local blood volume suggestive of the development of vascular congestion and interstitial edema. At the same tim the rate of local circulation increased as shown by an increase in the rate of the ascending limb and decreases in appearance time and the duration of the peak of maximal activity and the washout phase. After a 30-70% drop in superior mesenteric artery flow, the recorded radioactivity decreased by 20.3-45.4%, which is interpreted as a decrease in intestinal blood volume. The appearance time and washout phase were prolonged, and there were decreases in maximal activity and the rate of the ascending limb. Further refinements in detector geometry, shielding thicknesses, and the mathematical interpretation of these acute transit curves are being developed.

2889 **THE ROENTGENOGRAPHIC EVALUATION OF ASCITES.** *(E.)* Keeffe, E. J. (St. Joseph Mercy Hosp., Pontiac, Mich.), R. A. Gagliardi and R. C. Pfister. *Amer. J. Roentgen.* 101(2):388-396, 1967.

A review of the X-ray findings in 100 adult patients with known ascites and 400 others without ascites demonstrated that the hepatic angle sign (obliteration of the lower and lateral angle of the liver) and the flank stripe sign (widening of the line between the lateral wall of the colon and the peritoneum) are the most useful and reproducible criteria for the diagnosis of abdominal ascites. Among the 100 positive cases, the hepatic angle sign was positive in 78 and indeterminate in 22, while the flank stripe sign was positive in 91 and indeterminate in 9; taken together, the two signs made possible a correct diagnosis in 97% of the cases. Among the 400 patients without ascites, 324 had a clearly-defined normal hepatic angle sign and 368 a normal flank stripe sign, a total of 376 patients being correctly diagnosed by the combined evaluation of these two signs. The deficiencies of other commonly used signs (separation and floating of bowel loops, fuzziness or obliteration of the psoas muscle shadows, overall abdominal haziness, increased density shifting to the pelvis on upright roentgenograms, poor definition of major abdominal organs, and a relatively radiolucent shadow between the lateral wall of the liver and the abdominal wall) are reviewed and 8 cases are presented which illustrate various aspects of the radiological diagnosis of ascites. It is concluded that the hepatic angle sign is advantageous with larger amounts of fluid, but that its value is limited by fecal material in the ascending and transverse colon, which leads to the possibility of false positives. The flank stripe sign is of greater value with small amounts of fluid. When neither can be used directly, air or barium should be introduced to produce controlled distension of the colon befor evaluation of the flank stripe sign.

2890 **PERCUTANEOUS NEEDLE BIOPSY OF THE LIVER.** *(E.)* Picazo, E. (Lahey Clin., Boston, Mass.) and F. F. Whitcomb. *Lahey Clin. Found. Bull.* 17(3): 121-126, 1968.

A review of experience with 185 consecutive percutaneous needle biopsies performed on 180 patients between 1956 and 1965 demonstrated that the technique is safe and is a useful aid in the diagnosis and prognosis of hepatobiliary disease. The most common diagnoses were metastatic cancer (20%), periportal inflammation and fibrosis (20%), and various types of cirrhosis (18%), while in 24 cases the biopsy was normal. There were only 2 complications (both intraabdominal bleeding), one of which was fatal (death in shock within 24 hr in a patient with 80% prothrombin and a hemoglobin of 4.0). In a group of 40 patients known to have liver metastases (results of necropsy or open biopsy), needle biopsy was negative in 10 (25%), 2 of which had been diagnosed as "normal," 7 as "periportal inflammation" and 2 as "biliary stasis." It is emphasized that focal lesions can often escape detection by needle biopsy. A 2nd biopsy yielded a different diagnosis in only 1 of 4 patients (metastatic cancer instead of a diagnosis of periportal inflammation and fibrosis). The equipment, techniques, indications and complications of needle biopsy are reviewed (5 refs.), and it is concluded that needle biopsy is contraindicated by hemorrhagic diathesis, serious infections, echinococcal cysts, hepatic coma, and possibly by obstructive jaundice (due to the increased risk of bile peritonitis).

2891 **^{198}Au LIVER SCANNING IN HEPATIC AMEBIC DISEASE.** *(E.)* Otero, E. (Natl. Cancer Inst., Bogota, Colombia). *J. Nucl. Med.* 9(7):406-411. 1968.

Among 46 patients with hepatic amebiasis subjected to liver scanning 10-15 min after the i.v. injection of 400-900 μC of colloidal ^{198}Au, 33 were found to have amebic abscesses (space-occupying lesions in the liver scan). Only 3 of these lesions were in the left lobe. All but 4 were confirmed by drainage, either at laparotomy or by transthoracic puncture, and these 4 responded rapidly to medical treatment (emetine and chloroquine). There were no false negatives, although one patient had a normal anterio-posterior scan with a lesion on the lateral scan. There was a significant correlation ($r = 0.85$) between the pus content of the abscess and the diameter of the lesion on the scan, the smallest detected being 2.5 cm in diameter with 20 ml of pus. Among the 13 patients with normal liver scans, 2 were confirmed at laparotomy, 4 represented follow-up studies on patients previously treated by drainage for hepatic abscess, and 7 had shown transitory signs of hepatic amebiasis which had cleared up rapidly on medical treatment; it is uncertain whether these were cases with small undetected abscesses or with diffuse amebic hepatitis. Follow-up scans done up to 8 months after treatment in 10 of the 33 positive cases revealed a rapid recovery during treatment, although visible lesions persisted for as long as 5 months.

2892 **GASTRIC BLOOD FLOW MEASUREMENT BY TECHNETIUM CLEARANCE TECHNIC: AN EVALUATION.** *(E.)* Meredith, J. H. (Bowman Gray Sch. Med., Winston-Salem, N. C.) and J. Khan. *Amer. Surg.* 33(12): 969-972, 1967.

Simultaneous measurements of gastric blood flow by means of an electromagnetic flowmeter and by the ^{99}Tc clearance technique in 31 fasted mongrel dogs under pentobarbital anesthesia demonstrated that the indirect ^{99}Tc method is accurate and reliable. In the indirect method, 1 mC of ^{99}Tc-pertechnetate was injected into the tongue vein and periodic samples were taken of both the gastric juice and the femoral and splenic venous blood. Gastric secretion of ^{99}Tc was estimated from the gastric juice samples, clearance of ^{99}Tc was determined from the difference between the splenic and femoral vein levels, and gastric blood flow was calculated by dividing the two results. In ml/min/100 g stomach, the calculated blood flow averaged 32.85 (9.4-69.8 in individual animals) and the measured blood flow averaged 33.3 (10.8-48.9 in individual animals), with a highly significant degree of correlation between the two ($p < 0.001$). The considerable variation in flow from animal to animal is ascribed to the possible effects of age, nutritional status, genetic background, unknown diseases, etc.). There was little variation in gastric blood flow with time, and betazole HCl (Histalog; 0.5-1.0 mg/kg i.m.) had no significant effect.

2893 **CONTROL OF DIARRHEA BY CHOLESTYRAMINE ADMINISTRATION.** *(E.)* Rowe, G. G. (U. Wisconsin Med. Sch., Madison). *Amer. J. Med. Sci.* 255(1): 84-88, 1968.

In 6 patients (3 men and 3 women, 16-44 yr old) with diarrhea, abdominal distress, urgency to stool and tenesmus, including one patient with an irritable bowel syndrome, one with an ileotransversostomy and ileal resection due to regional enteritis, and 4 with ileal bypass and atherosclerotic cardiovascular disease, administration of cholestyramine (1-12 g/day p.o.) produced prompt relief of symptoms and decreased diarrhea from 3-15 to 1-4 stools/day, although persistent frequency of defecation remained a problem in 2 of the 6. The diarrhea in patients with ileal bypass or resection is ascribed to failure of ileal absorption of bile salts, as a result of which they enter the large intestine, inhibiting water transport, increasing intestinal motility, and acting as a cathartic. Cholestyramine presumably acts by binding the bile salts in the small intestine.

2894 **CLINICAL EXPERIENCE WITH COMBINED TRANQUILIZER-SPASMOLYTIC TREATMENT IN ABDOMINAL DISORDERS.** *(Ger.)* Mayerl, H. (Dept. Int. Med., State Marien Hosp., Amberg, Germany). *Deutsch. Med. J.* 19(1):41-44, 1968.

Ninety-seven patients of both sexes, aged up to 80 and suffering from abdominal disorders with or without organic lesions were treated during a period of 7-35 days with Tranquo-Buscopan, 3 to 6 tablets per day. Each tablet of Tranquo-Buscopan contains 10 mg hyoscine N-butylbromide (Buscopan) and 10 mg 7-chloro-1,3-dihydro-3-hydroxy-5-phenyl-2H-1,4-benzodiazepine-2-on (Oxazepam). The results in 43 patients with gastroduodenal ulcers were as follows: complete remission in 10, improvement in 20, and no effect in 6; in 7 patients results were inconclusive. Another category consisted of 11 patients with functional gastric disorders accompanied by prominent hyperexcitability, anxiety, and agitation. All patients responded fairly well to treatment. A third category consisted of patients with functional or organic intestinal disorders (colic spasms, irritable colon, enterocolitis, mucous and ulcerative colitis with pains, spasms, flatulence, diarrhea, or constipation). Results for this group were as follows: remission in 7, improvement in 16, and no effect in 2; results were inconclusive in 1 patient. In ulcerative colitis, Tranquo-Buscopan was used in combination with other drugs. The last category consisted of 10 patients with gastritis, 2 with biliary dyskinesia, and 2 with gallbladder spasms. The treatment was effective. The drug was well tolerated by the gastrointestinal tract and caused no hematological shifts, atropine-like side effects, central extrapyramidal signs, or changes in serum transaminase (except in one patient with an already damaged hepatic parenchyma). Three side effects were noted: 1) an allergic skin reaction in the form of generalized urticaria (1 patient); 2) fatigue (4 patients); and 3) drowsiness (in ¼ of the patients following alcohol intake).

2895 **STUDY OF 13.907 R.P. IN COMMON DIGESTIVE PATHOLOGY.** *(Fr.)* Abry, M. (U. Hosp. Ctr., Lyon, France). *J. Med. Lyon* (1135):129-131, 1968.

The papaverinic muscle relaxant Labrodax (13,907 R.P.; 2,4,6-trihydroxypropiophenone) was used at a dosage of 160-240 mg/day p.o. for periods varying from a few days to several weeks in the treatment of 45 patients (23 men and 22 women, 16-68 yr old) with visceral spasm due to esophagogastric, large-intestinal or hepatobiliary disease. Favorable results ("good" or "very good") were obtained in 3 of 5 cases of right hypochondralgia, 1 of 3 cases of biliary dyspepsia, 9 of 12 cases of intestinal colic, 5 of 8 cases of epigastralgia, and all 16 cases of diarrhea, diffuse abdominal pain, and/or a false urge to defecate, but in neither of the 2 patients with megaesophagus and in only 2 of 7 cases of anal pain due to fissures or hemorrhoids. One patient with general intolerance to antispasmodics had to discontinue treatment because of vertigo and headache, and another complained of constipation. Labrodax is concluded to be a well-tolerated and effective antispasmodic which is particularly useful in the control of intestinal and biliary spasm, although its choleretic activity remains in doubt.

2896 **COMPARATIVE TRIAL OF A NEW ANTACID AND ANTICHOLINERGIC COMBINATION IN GENERAL PRACTICE.** *(E.)* Harris, P. G. (Belfast, Northern Ireland). *Practitioner* 200(1198):431-433, 1968.

A combined preparation containing 25 mg orphenadrine HCl, 150 mg light magnesium carbonate and 800 mg dried aluminum hydroxide gel per 10-ml dose was compared with aluminum hydroxide alone in a double-blind cross-over trial on 20 patients with dyspepsia, each preparation being given for 14 days. Among 9 patients who received aluminum hydroxide first, only the 2 with no previous history of dyspepsia improved and 7 remained unchanged. After being switched to the orphenadrine mixture, 6 of these 7 improved immediately, all improved within 14 days, and the 2 who had improved on alumina alone considered themselves cured. Among 11 patients who received the mixture first, 10 reported rapid relief of symptoms, while one showed no response to medical therapy and eventually required surgery. After being switched to alumina, 1 of these 10 complained of a definite return of symptoms and 5 said that they did not feel as comfortable. After completing the full 4 weeks of treatment, 14 of 20 definitely preferred the mixture while 1 preferred the alumina. The only side effect noted was constipation (appearing in 1 patient on the mixture and in 3 on alumina). These results suggest that orphenadrine made a marked contribution to relief of dyspepsia in doses which did not produce generalized parasympatholytic effects.

2897 **AN EVALUATION OF A BISMUTH ALUMINATE ANTACID.** *(E.)* Rider, J. A. (255 Hugo St., San Francisco, Calif.), H. C. Moeller, J. O. Gibbs, E. J. Puletti and D. C. Desai. *Curr. Ther. Res.* 10(3):109-115, 1968.

Among 53 patients (31 men and 22 women, 24-83 yr old) with duodenal (16), gastric (3) or marginal (1) ulcers, duodenitis (2), gastritis (24) or hiatal hernia (7), treatment with Eucote (tablets containing 100 mg bismuth aluminate, 100 mg magnesium trisilicate and 300 mg of a coprecipitate of aluminum hydroxide and magnesium carbonate) at a dose of 1-2 tablets hourly or 4 times daily for from 1 week to 7 months (average 2.5 months) yielded excellent results in 27, good results in 23, slight improvement in 2 (1 with duodenal ulcer and 1 with duodenitis), and no response in 1 (gastritis). The only side effects were occasional constipation, dry mouth and dry throat in 1 patient each. Preliminary studies showed that bismuth aluminate by itself is a poor antacid, but that Eucote produces a rapid increase in pH if 2 tablets are added to 145 ml of 0.017 N HCl. Furthermore, the gastric pH increased to 4.1 in 10-20 min after administration of 2 tablets to normal human subjects, and remained above 3.5 for 30-45 min. The peptic activity of gastric juice obtained from normal human subjects was not significantly affected by administration of the antacid alone, and 200 mg bismuth aluminate alone decreased the peptic activity by only 24% in 15 min (with a rebound to 16% above control values 15 min later). Two tablets of Eucote, however, decreased the peptic activity by 72% in 15 min, and the activity was still 24.7% below the control value 15 min later.

2898 **ATTEMPTS TO AUGMENT PANCREATIC SELENOMETHIONINE UPTAKE: EFFECT OF RAW SOYBEAN DIET.** *(E.)* Siegel, B. (Washington U. Sch. Med., St. Louis, Missouri), R. Jacobs, R. Studer and E. J. Potchen. *J. Lab. Clin. Med.* 71(6):945-947, 1968.

Pancreas and surrounding tissue uptake of ^{75}Se-selenomethionine was determined in white female rats injected with 20 μC of radioisotope after 8 days on an 11.5% raw soybean diet; the animals were killed 5, 25 and 120 min after injection. Tissue samples of pancreas, liver, stomach, proximal jejunum, kidney, and retroperitoneal adipose were taken and analyzed for the percentage of injected radioactivity per g of dry weight tissue, the percentage of injected radioactivity per μg of nitrogen, and the percentage of radioactivity in the protein fractions. Pancreas ^{75}Se-selenomethionine uptake was significantly increased at 25 and 120 min in the soybean-fed rats; the result was most marked at 25 min when there was a two-fold increase in pancreas isotope content. Similar increases in the other tissues scanned were not observed at 25 min. Proximal jejunum showed an increased uptake at 120 min which was inexpicable since the lumen contents had been removed. Pancreas uptake also increased on a per μg of nitrogen basis; the increases were less marked than when expressed as uptake per g of dry tissue. The rate of isotope incorporation into pancreas protein was significantly increased in soybean-fed rats at 5 min. No appreciable difference in protein incorporation in pancreas or liver samples at 25 min and 2 hr was noted. These observations warrant further investigation before attempts are made to use pancreas selenomethionine uptake for clinical pancreas scanning.

2899 CLINICAL APPRAISAL OF INSULIN GASTRIC ANALYSIS. *(E.)* Stempien, S. J. (VA Hosp., Long Beach, Calif.), E. R. Lee and A. E. Dagradi. *Amer. J. Dig. Dis.* 13(1):21-34, 1968.

A review of clinical experience with over 625 insulin tests during the period 1947-67 indicates that insulin-induced hypoglycemia is a valid test for achlorhydria and can be used effectively to assess the adequacy of vagotomy or antrectomy, provided suitable techniques and criteria are employed in its interpretation. The recommended technique involves intubation with a double-lumen tube, continuous aspiration of 15-min samples, measurement of acid in mEq/hr, and measurement of a 2-hr basal secretion followed by a 2- to 4-hr secretion after insulin at a dose of 10-11 units. The criteria for a negative insulin response, indicating a "borderline-complete" or "adequate" vagotomy or antrectomy, are a basal and postinsulin HCl both below 0.05 mEq/hr and a postinsulin pH above 2.5. A borderline positive response, with a basal HCl below 0.25 mEq/hr and a postinsulin rise of 0.05-0.25 mEq/hr with a postinsulin pH below 2.5 is also considered to indicate "adequate" surgery (borderline incomplete). Vagotomy or antrectomy are inadequate in all patients with positive insulin responses (postinsulin rise of more than 0.25 mEq/hr and pH below 2.0) and also in the case of "false negative" responses (postinsulin HCl secretion below basal) if the basal level is above 0.25 mEq/hr. Using these criteria, 144 insulin tests on patients presenting with a variety of postoperative sequelae 2 months to 16 yr after surgery (average 5 yr and 7 months) were classified in a blind manner and correlated with clinical status. Whereas none of the 54 patients with negative insulin responses (47 with hypoglycemia below 50 mg% and 7 with higher blood sugar levels) had recurrent ulcers or peptic symptoms, 2 of 5 with false negative responses and 51 of 85 with positive responses had complications (peptic ulcer in 36 of 51, symptoms in 14 of 51, and peptic esophagitis in 1 of 51). Using the more liberal criteria of the Hollander test (vagotomy "adequate" in the presence of a postinsulin rise of 1-2 mEq HCl/hr or less), on the other hand, many of the tests classified as "positive" would have been called "negative" and the correlation between clinical status and insulin response would have been lost. Furthermore, the Hollander criteria are based on changes in concentration of acid rather than on total acid output, leading to possible errors due to changes in volume. Except for one case with a delayed positive response mentioned in an addendum, proved recurrent ulcers have only been observed in patients with a positive insulin response, by the strict criteria, in the first 2 hr. A delayed response in the 3rd or 4th hr is also considered to be evidence of incomplete vagotomy, however. Clinical experience with the insulin test after antrectomy confirms the findings of animal studies which indicate that cephalic secretion is essentially an integrated neurohumoral response, involving a vagal release of antral gastrin. The marked depression of basal secretion in the group with a negative insulin response indicates that this is also largely under cephalic control.

2900 QUANTITATIVE MEASUREMENT OF LIVER IRON BY NEEDLE BIOPSY. *(E.)* Frey, W. G. III. (VA Hosp., White River Junction, Vt.), M. H. Gardner and J. A. Pillsbury. *J. Lab. Clin. Med.* 72(1):52-57, 1968.

A method is described for the quantitative determination of iron in needle-biopsy specimens of liver tissue, and the results in 38 cases are compared with histological estimates of iron content by staining techniques (Perls). The colorimetric determination is based on the reaction between ferrous Fe and bathophenanthroline (optical density read at 535 mμ), following digestion of the tissue with 10 N H_2SO_4, ashing at 550C, hydrolysis with HCl, and reduction with thioglycolic acid at pH 4.5-5.0 (acetate buffer). Among the 40 specimens obtained from 38 male patients, histological staining showed no iron in 16, trace amounts (grade of +) in 12, moderate deposits in the Kupffer's and parenchymal cells (++) in 4, and heavy deposits (+++) in 8 (including 6 of 7 patients with hemochromatosis, 2 of whom were studied before and after phlebotomy). Quantitative results varied from 5 to 1125 μg Fe/100 mg fresh tissue, the ranges being 5-28 μg/100 mg for 16 biopsies graded histologically as "0," 28-155 μg/100 mg for 12 biopsies graded +, 82-164 μg/100 mg for 4 biopsies graded ++, and 233-1125 μg/100 mg for 8 biopsies graded +++. In the 2 patients, 30-60 phlebotomies decreased the liver Fe from 324 to 21 and from 634 to 80 μg/100 mg, resp. The amounts of iron found in the livers of these patients were significantly greater than those found in necropsy studies, using a different method, but were consistent with the clinical results of phlebotomy. The technique is recommended for diagnostic use and for evaluating the effects of therapy in iron storage diseases.

2901 COLONIC EXFOLIATIVE CYTOLOGY BY AN IMPROVED TECHNIQUE. *(E.)* Vacca, V. F. (Griffin Hosp., Derby, Conn.), A. Pinto, H. M. Spiro and V. A. DeLuca. *Amer. J. Dig. Dis.* 13(8):727-734, 1968.

Purgative and diagnostic enemas were performed in 140 patients with colonic disease to obtain stainable mucus specimens for cytological examination to aid in diagnosis; 1-3 cleansing enemas were given to eliminate fecal contamination of diagnostic slides. A comparison of mucus and sediment smears was made in 75 patients; mucus preparations gave better nuclear and cytoplasmic detail and increased cellularity. False positive results were found in 4 patients; false negative results were also found in 4 patients. The procedure is valuable in differentiating benign and malignant cells. It is recommended in cases of suspected malignancy, to differentiate diverticulitis and malignancy, to elucidate the nature of polyps and partially obstructing lesions, in follow-up studies of patients having undergone colonic resection; and in following patients with longstanding ulcerative colitis.

2902 RADIOLOGICAL CHANGES OF THE SMALL INTESTINE IN COMBINED ENZYMIC DEFICIENCY (GLUTEN INTOLERANCE AND LACTASE DEFICIENCY). *(E.)* Nedkova-Bratanova, N. (Inst. Nutr., Bulgarian

Acad. Sci., Sofia, Bulgaria) and S. Yanev. *Digestion* 1(1):43-51, 1968.

Distinct radiological signs such as dyskinesia, small intestinal aerophagia, acceleration of the transit time, hypersecretion, etc., found in a patient with gluten and lactose intolerance are identical with those radiological signs observed in allergy of the small intestine. This is an indication that in those patients considered as having small intestinal allergy on the basis of radiological studies, a polyenzymic deficiency may be the true underlying disorder.

2903 **SCINTILLOGRAPHY IN THE DIAGNOSIS OF PANCREATIC DISEASE.** *(E.)* Brown, P. W. (Western Gen. Hosp., Edinburgh, Scotland), W. Sircus, A. N. Smith, A. A. Donaldson, I. W. Dymock, C. W. A. Falconer and W. P. Small. *Lancet* 1(7535):160-163, 1968.

Scintillographic scanning was performed in 11 patients with known pancreatic disease, 51 with suspected pancreatic disease, and 18 with abdominal symptoms of unknown origin 30 min and 2 hr after 3 μC/kg i.v. administration of ^{75}Se-selenomethionine; all patients were fasted overnight before the start of the study. Exocrine pancreatic function was assessed in 20 patients by duodenal aspiration after secretin and pancreozymin stimulation. False negative results were seen in 3 of 37 apparently normal scans; although 1 of the 3 patients showed less pancreatic body and tail uptake than head and neck uptake, the identification of the scan as normal was proved false by surgical demonstration of pancreatic carcinoma. Abnormal scans were found in 39 patients, 21 of whom had surgically proven pancreatic disease and 9, clinical manifestations of pancreatic disease; false positives occurred in 6 instances. Of 14 pancreatic tumor patients, 13 had abnormal isotope uptake. False positives were seen in 3 of the 6 obstructive jaundice patients. Of the 20 subjects in whom scanning and hormone stimulation studies were done, the results disagreed in only 4. Scintillography is of considerable value in diagnosing difficult cases of acute and chronic pancreatitis and in assessing post-operative and post-attack recovery of pancreatic function. Quantitative scanning, when perfected, will replace hormone stimulation and duodenal intubation as conventional function-testing devices.

2904 **THE ENDOSCOPIC DIAGNOSIS OF HIATUS HERNIA** *(E.)* Rozen, P. (VA Hosp., Hines, Ill.), D. H. Hanscom and R. C. Fruin. *Israel J. Med. Sci.* 4(1):60-65, 1968.

The Eder-Bernstein gastroscope, by enabling direct visualization of the esophagogastric junction and its relation to the cardia, has proven a valuable adjunct to radiography in diagnosing small hiatus hernias. A series of 463 patients were observed. Hiatus hernias were found in 96 of 332 patients (35%) undergoing Eder-Bernstein gastroscopy, and in 110 of 425 patients (26%) examined radiographically. Both upper gastrointestinal radiography and gastroscopy were performed in 309 patients, 88 of whom had hernias demonstrated by gastroscopy; 42 of these 88 hernias were also demonstrated by radiography. Of 73 hiatus hernias shown by radiography, 31 were gastroscopically demonstrated. The data indicate that both methods contribute to the diagnosis and neither alone can exclude the presence of hiatus hernias, especially of small hernias.

2905 **ESTIMATION OF GASTRIC ACIDITY BY X-RAY.** *(E.)* Kleeberg, J. J. (Rothschild Munic., Hosp., Haifa, Israel). *Israel J. Med. Sci.* 4(1):149-151, 1968.

The dissolution of a gelatin capsule containing 3 radio-opaque barium sulfate pellets was observed radiologically in the stomachs of 26 duodenal ulcer and gastrointestinal disease patients, and the time of onset and total dissolution time were measured in an assessment of X-ray determination of gastric acidity; a change in the alignment of the barium pellets formed the basis for gelatin capsule dissolution. *In vitro* studies determined standard dissolution times at pH 1.0, 2.5, 3.5, and 8.0 at 37C. Disintegration at pH 1.0 began after 3-4 min, and the first pellet fell out after 8-10 min. At pH 2.5, digestion started at 6-7 min and was definite at 20 min. No change in size or shape of the capsule was observed even after 30 min at pH 8.0. The results show that in 8 of 14 ulcer patients, the capsule began to disintegrate at 10-12 min and at least 1 pellet was out of alignment. In normal or subnormal acidity, no digestion occurred at 10 min; disintegration took between 18 and 20 min. In anacidic patients, no capsule changes were observed even after 20 min. This test gives rough estimates of gastric acidity and assesses hyperacidity with certainty, and the lack of free HCl or normal acidity with a high degree of probability. The procedure is rapid, requires no lab facilities, has no contraindications, discomfort, or dangers, can easily be repeated, and can be followed by complete X-ray examination using barium on the same morning.

2906 **THE DIAGNOSIS OF PORTAL HYPERTENSION WITH ^{131}I.** *(E.)* Lewitus, Z. (Beilinson Hosp., Tel Aviv, Israel) and J. Laor. *Israel J. Med. Sci.* 4(1):41-46, 1968.

One day after blocking thyroid ^{131}I uptake with Lugol's solution, 40-50 μC of ^{131}I-sodium iodide, diluted in 10 ml of water, was given rectally to 60 fasting patients to evaluate this test as a means of identifying portal hypertension; 31 patients had suspected liver disease and 29 had various other diseases. Two wide-angle scintillation detectors connected to 2 ratemeters were positioned in the right hypochondrium and left temporal regions, resp.; the liver detector was placed on the skin surface in the mid-clavicular line. The hepatogram and blood disappearance curves were recorded simultaneously immediately after iodine injection. In patients with portal hypertension, increased portal venous pressure diverts rectal blood flow from the portal circulation and causes its drainage at equal rates through the hepatic portal system and through the systemic veins. Normal curves were obtained in 35 of the 60 patients; of these 29 were free of liver disease. The remaining 6, clinically diagnosed as having liver disease, were classed as false negatives. Abnormal curves were found in 25 of the 31 patients with suspected liver diseases; diagnosis of cirrhosis or liver metastasis was verified in 2 of these by biopsy or at autopsy. Congestive heart failure, irritable colon, and vague gastrointestinal complaints were diagnosed in 3 of the 11 patients in whom pathological examinations were not done; these were classed as false positives. Two acute hepatitis patients had normal curves, as did a familial nonhemolytic jaundice patient. This procedure is considered valuable in portal hypertension diagnosis; its reliability will be proved by correlation of ^{131}I hepatographic curves with actual portal venous pressure measurements.

2907 A NEW DIAGNOSTIC PROCEDURE FOR EVALUATING ESOPHAGEAL ATRESIA. *(E.)* Johnsonbaugh, R. E. (Ohio State U. Coll. Med., Columbus). *Amer. J. Dis. Child.* 116(2):175-178, 1968.

A new diagnostic procedure is described for determining the presence of esophageal atresia by measuring the pH of the mouth and stomach contents aspirated through a stiff esophageal cannula inserted through the nares. Mouth pH was measured in 39 normal infants, 6 infants with excessive mucus after birth, and 1 infant with symptomology typical of esophageal atresia. In 38 subjects, the mouth pH was greater than 5.5, with that of the remaining infant being 5. Stomach contents were also examined and the pH was found to be extremely acidic; the 6 excessive mucus patients were later diagnosed as clinically normal. An attempt to pass the catheter into the stomach met with resistance at about 13 cm in the symptomatic patient; aspirate pH was 6.5. A small amount of contrast medium introduced through the catheter revealed a blind esophageal pouch on a roentgenogram. Diagnostic errors caused by catheters coiling in the nasopharynx or a wide upper esophageal pouch can be avoided this method. Correlation of aspirate pH and length of the catheter introduced, and determination of catheter position by the measured pH form the basis of this study.

2908 ORAL MAINTENANCE THERAPY FOR CHOLERA IN ADULTS. *(E.)* Nalin, D. R. (Inst. Publ. Health, Dacca, Pakistan), R. Cash, R. Islam, M. Molla and R. A. Phillips. *Lancet* 2(7564):370-373, 1968.

After initial intravenous hydration to treat shock, 29 selected patients with acute diarrhea due to *Vibrio cholerae* were divided into 3 groups. Group I consisted of 10 patients who received a solution containing 0.5 g potassium chloride, 4.22 g sodium chloride, 4.0 g sodium bicarbonate, and 20 g glucose per liter via an orogastric tube. Group II consisted of 10 control patients who received only intravenous therapy to replace stool loss. The i.v. solution consisted of 5 g sodium chloride, 4 g sodium bicarbonate, and 1 g potassium chloride per liter. Group III consisted of 9 patients who drank a similar solution as that in group I. Group I and III patients required 80% less intravenous fluids than the group II controls. An oral solution containing glucose and electrolytes can eliminate the need for more than three-quarters of the intravenous-fluid requirement in the therapy of acute cholera in adults.

2909 TOLBUTAMIDE GASTRIC ANALYSIS: CLINICAL CORRELATIONS AND INTERPRETATIONS. *(E.)* Stempien, S. J. (VA Hosp., Long Beach, Calif.), E. R. Lee and A. E. Dagradi. *Amer. J. Dig. Dis.* 13(7):643-655, 1968.

In view of the increasing number of postvagotomy patients in the older age group, in which the use of insulin gastric analysis is contraindicated, a preliminary trial was conducted on 110 patients (108 men and 2 women, 29-76 yr old but 67 over the age of 50), subjected to various types of peptic ulcer surgery 3 months to 11 yr earlier and including 4 with diabetes and 80 with serious complicating diseases which would contraindicate the use of insulin, to determine the suitability of i.v. tolbutamide for evaluating the adequacy of vagus nerve section. Among the 110 consecutive tolbutamide tests (1.0 g tolbutamide i.v. in 3-5 min, preceded and followed by measurements of gastric acid secretion and blood glucose levels), 52 were positive (a rise of 0.25 mEq/hr or more over the basal secretion), 5 were borderline positive, 11 were false-negative (depression of a significant basal acid secretion after tolbutamide), and 42 were negative. Recurrent peptic disease was observed in 34 of 52, 1 of 5, 7 of 11, and 1 of 42, resp., and the one patient with a recurrence in the last group actually had an unreliable tolbutamide test with a positive insulin test. There was no significant correlation between type of surgery and response to tolbutamide, but it is noteworthy that 4 of 6 patients were negative after gastrectomy alone, as was one patient with gastric atrophy who was not operated. Among the 42 negative patients, 25 showed an acid response to histamine or histalog, 5 showed a response to meat extract, and 5 showed fluctuations in pH below 5.0 in the tolbutamide test, so that only 7 of the 42 could have been incapable of secreting acid. Blood-sugar responses were similar in the positive and negative groups. In 12 patients subjected to both insulin and tolbutamide tests, tolbutamide-induced hypoglycemia was found to be less marked but was more prolonged. The results of the two tests were in agreement in 9 of 12, while 1 patient with a negative insulin test was borderline-positive with tolbutamide, and 2 patients with negative tolbutamide tests were positive or borderline-positive with insulin (one of these 2 had a recurrence). Side effects due to tolbutamide were rare and minimal (venous burning in one case, mild epigastric distress in 2, mild transitory light-headedness and giddiness in 2, and protracted hypoglycemia in 2). One other patient not in this group of 110 (a 46-yr-old man treated by vagotomy and Billroth I gastrectomy for intractable duodenal ulcer) developed marked stupor, tremor, pallor and sweating 1 hr after tolbutamide. The tolbutamide test is concluded to be the procedure of choice for evaluating the adequacy of vagotomy and/or antrectomy in poor-risk patients and the aged.

2910 RADIOISOTOPE PHOTOSCANNING OF THE SALIVARY GLANDS. *(E.)* Razzak, M. A. (Doctors Hosp., Cleveland, Ohio) and D. B. Sodee. *Amer. J. Gastroent.* 49(6):503-505, 1968.

A space-occupying lesion of the upper and anterior portions of the parotid gland was revealed by sodium pertechnetate ^{99m}Tc photoscanning in a 73-yr-old male patient. Technitium belongs to the same periodic group as iodine and is taken up and concentrated by the thyroid and salivary glands; therefore, it was logical to use the isotope in evaluating salivary gland function in this patient complaining of pain in the region of the salivary glands. Histological examination of the tumor after surgery revealed a benign adenolymphoma.

2911 GLUTEN-INTOLERANCE AND FOOD ALLERGY: CLINICAL SIGNS AND RADIOLOGICAL CHANGES OF THE SMALL INTESTINE. *(E.)*

Pock-Steen, O. C. (Frederiksberg Hosp., Copenhagen, Denmark) and J. Lorenzen. *Radiol. Clin. (Basel)* 37(2):65-78, 1968.

The clinical and radiological findings in chronic food allergy and gluten intolerance are discussed on the basis of 50 specially-selected ambulatory patients (19 men and 31 women, 16-69 yr old) presenting with irritable colon, a tendency to hypoglycemia, asthenia, allergic symptoms and/or radiological changes in the small intestine, and followed for 1-4 yr. Based on the radiological findings and the response to a gluten-free diet, the patients were divided into 3 main groups: 16 with gluten intolerance in whom the predominant feature was dyspepsia, generally without allergic symptoms; 23 with persistent food allergy and less-marked dyspepsia; and 11 "mixed" cases. Although all 50 patients showed an accelerated jejunal transit, the acceleration was greater in the 2nd group (passage of a barium meal to the hepatic flexure in 2-3 hr in 13 of 23 cases and to the splenic flexure within 4 hr in 10 of 23, compared to 6 and 9 hr, resp., in normal controls) than in the 1st group (passage of barium into the ileum in 1 hr in 13 of 16 cases and into the cecum in 2-3 hr in 10 of 16, compared to 2-3 hr and 4-5 hr, resp., in normal controls); segmentation of the contrast column resulting in "torn" segments was also more common in the 2nd group, but contrast dilution and sectional dilatation were more marked in the 1st (enlarged jejunum and ileum in 12 and 9 of the 16 cases, resp., compared to 3 and 10 of the 23 patients in group 2). All but 4 patients had jejunal edema, but only 9 of 16 and 15 of 23, resp., had an accelerated ileal transit time. A gluten-free diet produced significant improvement in dyspepsia in 10 of 16, 7 of 23, and 6 of 11, while a subsequent elimination diet yielded further significant improvement in 0, 10 and 1, resp.; the overall effect of dietary therapy on dyspepsia was good in 10 of 16, 17 of 23 and 7 of 11, fair in 4, 2 and 3, resp., and nil in the others. With regard to allergic manifestations (asthma, vasomotor rhinitis, eczema, edema, urticaria), a gluten-free diet produced significant improvement in 9 of 38 cases and an elimination diet produced further significant improvement in 12, so that the overall effect of dietary therapy on allergic symptoms was good in 21 of 38, fair in 4 and nil in 13. Foods incriminated by the elimination diets included milk (9 cases), eggs (6), coffee (4), potatoes (2), rice (1) and fish (1). Although gluten intolerance and chronic food allergy must both be distinguished from classic celiac disease on the basis of these findings, the therapeutic results suggest a causal connection between gluten intolerance and chronic food allergy. It is suggested that gluten may cause initial damage to the intestinal mucosa, opening the way for absorption of protein macromolecules which would produce an antigen/antibody reaction and lead to hypersensitivity in susceptible individuals.

2912 IMPROVING DIAGNOSIS OF STOMACH LESIONS WITH INTRAGASTRIC PHOTOGRAPHY, CYTOLOGY AND BIOPSY. *(E.)*

Hoon, J. R. (Sheboygan Clinic, Wisconsin). *Amer. J. Gastroent.* 49(6): 488-493, 1968.

Earlier and more accurate diagnosis of stomach lesions requires the wider utilization of the double contrast X-ray technique, gastroscopy, gastric cytology, and the gastrocamera with and without a fibroscope; the Japanese have excelled in the safe use of these techniques to detect stomach cancer before it has advanced to the stomach muscularis. These diagnostic methods represent a "total" procedure for accurate diagnosis; They aid in the differential diagnosis of benign and malignant ulcers, cancer, and various forms of gastritis. Several cases are presented which emphasize the need for gastrocamera and biopsy in stomach cancer diagnosis. The use of these diagnostic methods will lead to improved treatment and eventually increased survival rates for patients with gastric cancer.

2913 THE DIAGNOSIS OF LACTOSE MALABSORPTION. *(E.)*

Gudmand-Hoyer, E. (Rigshospitalet, Copenhagen, Denmark) and S. Jarnum. *Scand. J. Gastroent.* 3(2):129-139, 1968.

Lactose tolerance tests and glucose-galactose tolerance tests are related to small intestinal lactase activity and to clinical symptoms of lactose malabsorption in a series of 129 patients, including 34 patients with either primary or secondary lactose malabsorption. A high correlation between maximum blood sugar rise during an oral lactose tolerance test and the ratio between the blood sugar rises following oral ingestion of lactose and of glucose-galactose was present in 41 patients. A fairly good relationship between jejunal lactase activity and the results of oral lactose or glucose-galactose tests was noted. It is concluded that an oral lactose tolerance test is usually sufficient to make a diagnosis of lactose malabsorption. If the lactose test indicates lactose malabsorption, a control test with glucose-galactose should be made. The demonstration of depressed lactase activity in the jejunum does not necessarily confirm the diagnosis of lactose malabsorption; however, a low lactase activity is a mandatory finding if lactose malabsorption does exist.

2914 THE SIGNIFICANCE OF RIGIDITY OF THE JEJUNUM IN THE DIAGNOSIS OF POSTOPERATIVE JEJUNAL ULCERS. *(E.)*

Schatzki, R. (Mt. Auburn Hosp., Cambridge, Mass.). *Amer. J. Roentgen.* 103(2): 330-338, 1968.

Normally, the roentgenological appearance of the postoperative anastomosed jejunum is pliable and flexible. Rigidity of the jejunum, usually accompanied by thickening of the local jejunal folds, may be the first and most obvious evidence of an abnormality in the region of the anastomosis. The swollen folds may coalesce and be completely efface, leaving an area with a smooth surface. When rigidity of the jejunum is seen, a careful search for an associated ulcer in this area is indicated, as rigidity may be the only demonstrable evidence of the ulcer. Patients in whom careful study of the rigid area showed no evidence of a crater have had the presence of ulceration proved at operation. Long rigid areas in the jejunum frequently attributed to scarring, have not been seen in such instances in the author's experience, and is probably not caused by scarring. It is supposed that an ulcer of the thin-walled jejunum will heal with a very short scar as is seen in the healing of gastric ulcers. In follow-up studies in a number of cases, the areas of rigidity become smaller or disappear. Until long areas of rigidity disappear, the ulcer should not be considered healed.

DIAGNOSTIC PROCEDURES AND GENERAL THERAPY

2915 SPLENIC RUPTURE: APPLICATION OF RADIOISOTOPE TECHNIQUES IN DIAGNOSIS. *(E.)* Jackson, G. L. (Harrisburg Hosp., Pa.) and D. Albright. *J.A.M.A.* 204(10):178-180, 1968.

An abnormal radioisotopic scintiscan revealed a splenic abnormality in a 60-yr-old male who suffered abdominal injury after an accident. Radioactive chromium ^{51}Cr-labeled erythrocytes were used to detect splenic damage. The spleen was removed and 2000 cc of blood was removed from the peritoneal cavity during emergency laparotomy. Multiple areas of discoloration were seen beneath the splenic capsule; marked hemorrhage was observed in tissue sections. Other less time-consuming methods of scintiscanning are being investigated for use in patients with multiple, serious abdominal injuries. This type of injury is difficult to diagnose without the use of radioisotopic techniques.

2916 LACK OF DIAGNOSTIC SIGNIFICANCE OF SERUM ALKALINE PHOSPHATASE VALUES IN DIFFERENTIATING HEPATOCELLULAR AND OBSTRUCTIVE JAUNDICE. *(E.)* Elibol, T. (Dept. Gastroent., Cleveland Clinic, Ohio), E. I. Winkelman, J. W. King and C. H. Brown. *Cleveland Clin. Quart.* 35(3):159-167, 1968.

This series consisted of 200 consecutive adult patients with serum alkaline phosphatase values of 25 King-Armstrong units or more. Diagnoses were established by 1 or more various procedures including needle biopsy of the liver (50 patients), laparotomy (59 patients), laparotomy and biopsy (58 patients), lymph node biopsy (3 patients), and by clinical manifestations without tissue diagnoses (30 patients). Patients were classified into 5 groups on the basis of histopathological diagnosis. Group I (51 patients) had hepatocellular diseases, group II (52 patients) had extrahepatic obstructive diseases, group III (41 patients) had metastatic hepatic neoplasms, group IV (24 patients) had skeletal diseases including neoplasms with bony metastases, and group V (32 patients) had miscellaneous disorders including those patients without definite tissue diagnoses and those patients with neoplasms affecting both the liver and the skeletal system. The mean alkaline phosphatase value in Group I was 86.2 King-Armstrong units. In this group, 14% had values of 25-30 units, 42% had values of 30-60 units, and 44% had values of 60-294 units. The mean value in group II was 86.5 units. Those with malignant types of obstruction had a mean value of 99.8 units with no values below 40 units, and those with benign types of obstruction had a mean value of 73.2 units. The mean value in group III was 87.0 units. In this group, 33% had values of 30-60 units and 65% had values of 60-320 units. In groups IV and V, no statistical investigations were made. The difference in alkaline phosphatase values between the hepatocellular and the obstructive groups is not statistically significant. The low correlation coefficient (0.232) between the serum alkaline phosphatase and the serum bilirubin values in the 132 jaundiced patients is too low to be of practical significance. A graph showing the serum alkaline phosphatase values plotted against the SGOT values suggests a lack of correlation between elevated values of these 2 enzymes.

2917 COMPARISON OF CURRENT RADIOLOGIC APPROACHES TO THE DIAGNOSIS OF PANCREATIC DISEASE. *(E.)* Eaton, S. B. (Harvard Med. Sch., Massachusetts Gen. Hosp., Boston), D. J. Fleischli, J. J. Pollard, R. A. Nebesar and M. S. Posaid. *New England J. Med.* 279(8): 389-396, 1968.

The diagnostic value of upper gastrointestinal barium examination, hypotonic duodenography, selective angiography, and radioisotopic photoscanning in assessing pancreatic function was investigated in 45 patients with suspected pancreatic disease; final diagnosis was made at surgery, autopsy, or after extensive clinical observation. All patients were subjected to barium examination; 57% were correct, 7% false-positive, and 36% false-negative diagnoses. Of the 36 patients undergoing hypotonic duodenography, 78% were correct, 3% were false-positive, and 19% false-negative interpretations, diagnostically normal duodenograms were correct if the head of the pancreas was normal at surgery or autopsy, regardless of the condition of the body and tail. Angiograms were correct in 55%, falsely positive in 7%, and falsely negative in 38%. A biphasic reliability pattern was revealed; correct results were obtained in 79% of 13 patients ultimately diagnosed with pancreas cancer or pseudocysts. In 8 chronic pancreatitis patients, studies were only 13% correct; it is concluded that angiography is fairly reliable for demonstrating tumors or pseudocysts, but not pancreatitis. Radioisotope photoscan diagnoses were correct in 72%, falsely positive in 19%, and falsely negative in 9%. Hypotonic duodenography and selective angiography are recommended when pancreaticoduodenal carcinoma is suspected. Diagnosis of suspected pancreas body and tail tumors should be confirmed by isotope photoscanning and selective angiography; the latter and upper gastrointestinal barium examination are recommended for suspected pancreatic pseudocysts; while duodenography and (to a lesser extent) photoscanning are recommended for diagnosis of suspected pancreatitis.

2918 METOCLOPRAMIDE AND RADIOLOGICAL DIGESTIVE PROCEDURE. *(Fr.)* Chevrot, L. (Ste-Marguerite Hosp., Marseille, France), G. Roux and J. C. Menard. *J. Med.* 139(1):11-21, 1968.

The use of metoclopramide in gastroenterological radiology is evaluated. Metoclopramide is nontoxic, has a central regulating effect, and elicits a selective reaction in the digestive tract. Metoclopramide, administered intravenously, is indicated for nausea, anxiety, vomiting, sialorrhea, regurgitation, and esophageal stenosis. A group of 143 patients observed for digestive symptoms received either 10 mg or 20 mg of i.v. metoclopramide. Barium X-ray examination was accomplished more rapidly with metoclopramide in 64 (approximately 2/3) of the patients. The use of metoclopramide with cineradiography permits an important reduction in the examination time.

2919 THE CINERADIOGRAPHIC EVALUATION OF THE BILIARY TRACT AFTER DRUG THERAPY FOLLOWING CHOLECYSTECTOMY, SPHINCTEROTOMY, AND VAGOTOMY. *(E.)* Stassa, G. (The New York Hosp.-Cornell Med. Ctr., New York City) and W. R. Grafe. *Radiology* 91(2):297-301, 1968.

The effect of a fatty meal (Lipomul), cholecystokinin, morphine sulfate, and propantheline on the biliary tract was studied radiographically with cholegrafin following each of several staged surgical procedures in 2 groups of mongrel dogs. One group had 3 staged procedures consisting of cholecystostomy, sphincterotomy, and vagotomy. A second group initially prepared with cholecystostomy underwent vagotomy followed by sphincterotomy. Cholecystectomy was also performed in some dogs. After cholecystostomy, the effect of Lipomul was variable. Cholecystokinin invariably produced a vigorous contraction of the gallbladder, no peristalsis of the common duct, and relaxation of the sphincter of Oddi. Morphine had no effect on the gallbladder, but produced secondary shortening and dilatation of the common duct due to contraction of the sphincter. Propantheline and cholecystokinin quickly reversed the effect of morphine. Following subsequent sphincterotomy, contraction of the gallbladder was unchanged but the response to morphine and propantheline were now absent. Neither cholecystectomy nor vagotomy altered the effects seen after sphincterotomy. Cholecystectomy alone did not alter the effects of the drugs on the ducts. It is concluded that the addition of opiate-like agents may interfere with the results of radiographic studies of the biliary tree, and that greater flow of contrast material and greater relaxation of the sphincter can be achieved when cholecystokinin or propantheline are administered.

2920 **EVALUATION OF STORAGE IRON BY CHELATES.** *(E.)* Harker, L. A. (U. Washington Sch. Med., Seattle), D. D. Funk and C. A. Finch. *Amer. J. Med.* 45(1):105-115, 1968.

Iron chelating agents were used to investigate iron storage and turnover, and the mechanism of iron chelation *in vivo* in 38 normal subjects and 82 patients with idiopathic hemachromatosis. In the chelate loading tests 500 mg of deferoxamine was given i.v., followed by a 24-hr urine collection; 5 mg of diethylenetriaminopentaacetic acid was also given i.v., followed by a 6-hr urine collection. ^{59}Fe-labeled feroxamine (5 μC/50 mg) and deferoxamine (500 mg) were given simultaneously to study differential feroxamine excretion. Liver parenchymal iron was estimated from liver biopsy material by the modified Douglas and Dacie method. Iron mobilization was determined by fecal iron analysis. The magnitude of iron stores had little effect on the amount of radioiron available for developing red cell incorporation; minimal fecal radioiron excretion occurred in all groups. Urinary radioiron excretion was similar in deficient and normal subjects, but larger amounts were excreted in iron-loaded subjects than in normal subjects. Fecal iron losses were about 40% of those found in urine. It is suggested that both urine and fecal iron excretion is derived from iron deposits in liver parenchymal cells. Patients with only reticuloendothelial iron overload and high plasma iron saturation do not excrete significant amounts of chelate iron. Deferoxamine probably enters liver parenchymal cells and binds excess storage iron. Two-thirds of intracellularly formed feroxamine passes into plasma to be excreted via the kidney and feces. This test is ideal for detecting parenchymal iron overload before irreversible pathologic changes occur; a positive deferoxamine test should be confirmed by liver biopsy.

2921 **A CENTURY OF GASTROSCOPY: THE HISTORY AND CONTEMPORARY STATUS OF AN EFFECTIVE DIAGNOSTIC TECHNIQUE.** *(Rev.)(Ger.)* Krentz, K. (1st Med. Clin., U. Hosp. Hamburg-Eppendorf, Germany). *Materia Med. Nordmark* 20(5):256-264, 1968.

2922 **THE STUDY OF SPLENOHEPATIC FUNCTION BY MEANS OF RADIOACTIVE ISOTOPES IN DIGESTIVE PATHOLOGY.** *(Rev.)(Fr.)* Baillet, J. (Broussais Hosp., Paris, France), B. Jaulmes and B. Weil. *Cah. Coll. Med. Hop. Paris* 9(5):393-405, 1968.

2923 **A SENSITIVE NON-DESTRUCTIVE METHOD FOR THE DEMONSTRATION OF BILE ACIDS ON THIN-LAYER CHROMATOGRAPHY.** *(E.)* Eastwood, M. A. (Royal Infirm., Edinburgh, Scotland) and D. Hamilton. *Biochem. J.* 105(2):37C, 1967.

2924 **MEASUREMENT OF WATER BALANCE–A GUIDE TO SURGICAL CARE.** *(E.)* Gump, F. E. (Columbia U. Coll. Phys. Surg., New York City), J. M. Kinney, C. L. Long and R. Gelber. *Surgery* 64(1):154-164, 1968.

2925 **FALSELY NEGATIVE CHOLECYSTOGRAPHY AND CHOLANGIOGRAPHY.** *(E.)* Kolodny, M. (Cornell U. Med. Coll., New York City), J. L. Colker, E. W. Callahan and W. G. Baker Jr. *Amer. J. Dig. Dis.* 13(7):669-673, 1968.

2926 **ROENTGENOGRAPHIC FINDINGS IN LOCALIZED TRAUMA TO THE PANCREAS IN CHILDREN.** *(E.)* Young, L. W. (U. Rochester Med. Ctr., N. Y.) and J. T. Adams. *Amer. J. Roentgen.* 101(3):639-648, 1967.

2927 **THE ARTERIOGRAPHIC APPEARANCE OF CARCINOMA OF THE UNCINATE PROCESS OF THE PANCREAS.** *(E.)* Baron, M. G. (Mt. Sinai Hosp., New York City), H. A. Mitty and B. S. Wolf. *Amer. J. Roentgen.* 101(3):649-655, 1967.

2928 **GASTRIC BIOPSY UNDER DIRECT VISION THROUGH FIBERGASTROSCOPE.** *(E.)* Tsuneoka, K. (Nippon Med. Coll., Japan). *Jap. J. Med.* 7(1):8-10, 1968.

2929 **BIOPSY OF THE INTESTINAL MUCOSA.** *(E.)* Yamagata, S. (Tohoku U. Sch. Med., Sendai, Japan). *Jap. J. Med.* 7(1):11-12, 1968.

2930 **AN ASSESSMENT OF POSTOPERATIVE TESTING FOR COMPLETENESS OF VAGOTOMY.** *(E.)* Johnston, D. (Royal Infirmary, Sheffield, England), D. G. Thomas, R. G. Checketts and H. L. Duthie. *Brit. J. Surg.* 54(10):831-833, 1967.

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2931 **PRINCIPLES AND IMPORTANCE OF RADIOTELEMETRIC ASSESSMENT OF A NUMBER OF PARAMETERS IN THE ALIMENTARY TRACT IN CHRONIC ENTEROCOLITIS.** *(Rus.)* Atakhanov, E. I., A. M. Kharatian, and N. V. Sapunova. *Klin. Med.* 46(4):77-81, 1968.

2932 **THE CLINICAL SIGNIFICANCE OF THE PUNCTURE LIVER BIOPSY IN THE CHRONIC DIFFUSE DISEASES OF THIS ORGAN.** *(Rus.)* Podymova. S. D. (1st Moscow Med. Inst., USSR). *Ter. Arkh.* 40(5):36-41, 1968.

2933 **BARIUM ENEMA EXAMINATION IN THE EVALUATION OF LARGE PELVIC MASSES.** *(E.)* Bryk, D. (Jewish Hosp. Brooklyn, N. Y.). *Amer. J. Roentgen.* 101(4):970-977, 1967.

2934 **PANCREATOGRAPHY–A REASSESSMENT.** *(E.)* Trapnell, J. E. (Bristol Royal Infirm., England). *Brit. J. Surg.* 54(11):934-939, 1967.

2935 **MUCOSAL BIOPSY OF THE COLON BY RETROGRADE INTUBATION–RESULTS AND APPLICATIONS.** *(E.)* Fox, J. A. (Royal Free Hosp., London, England). *Brit. J. Surg.* 54(10):867-871, 1967.

2936 **THE VALUE OF LIVER SCANNING IN THE DIAGNOSIS OF POLYCYSTIC DISEASE OF THE LIVER.** *(E.)* Peltokallio, P. (U. Cent. Hosp., Helsinki, Finland), P. J. Taskinen and V. Peltokallio. *Amer. J. Roentgen.* 101(3):543-547, 1967.

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GASTROINTESTINAL DISEASES

GENERAL

2972 **THE EFFECT OF ELEVATED BODY TEMPERATURE AND OF STRESS ON THE MOTILITY OF STOMACH AND COLON IN MAN.** *(E.)* Misiewicz, J. J. (Cent. Middlesex Hosp., London, England), S. L. Waller, R. H. Fox, R. Goldsmith and T. J. Hunt. *Clin. Sci.* 34(1):149-159, 1968.

In 21 normal male volunteers (av. age 19.9 yr) with pressure-sensitive radiotelemetering capsules in the stomach and intestines, increasing the body temperature (as measured in the external auditory canal) to 38-39C resulted in a significant and progressive decrease in gastric motility (as measured by both intraluminal pressure changes and muscular activity) but had no effect on motility in the large intestine. Stress induced by immersion of one hand in ice water had no effect on motility in either the stomach or colon. In these studies, controlled hyperthermia was achieved by exposure to a hot airstream in a vapor barrier suit, and the localization of the radiocapsules was deduced from the characteristics of the intraluminal pressure and muscular activity records as compared with previous studies carried out under fluoroscopic control. Records from the antrum and small intestine were excluded. Elevation of the body temperature to 37.5C also produced some inhibition of gastric motility, but the results were not statistically significant. There was no correlation between the subjective degree of stress and the inhibition of gastric motility. Five of the subjects, however, complained of lower abdominal pain during hyperthermia, accompanied by inhibition of gastric motility. It is concluded that inhibition of gastric motility is a specific effect of an elevated body temperature, the mechanism of which remains unknown. This effect may be related to the symptoms of alimentary dysfunction often observed during exposure to severe heat stress, as well as to the diarrhea developing during travel in hot climates.

2973 **OBSTRUCTION OF THE THORACIC DUCT AT ITS ORIGIN BY ELECTROCOAGULATION IN THE RABBIT. CONSEQUENCES IN THE SPLANCHNIC AREA: 1) LYMPHO-VENOUS COMMUNICATIONS AT THE LEVEL OF THE PORTAL VEIN AND THE INFERIOR VENA CAVA; 2) HISTOLOGICAL LESIONS IN THE LIVER, PANCREAS AND SMALL INTESTINE.** *(Fr.)* Sarles, J. C. (St. Marguerite Hosp., Marseille, France), H. Pietri, R. Assadourian and G. Le Breuil. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):49-60, 1968.

Biopsy of the liver, pancreas and small intestine and a study of lymphatic flow in the splanchnic area (by injection of a blue dye and of air into a colonic lymph duct) were carried out 8-15 days after successful obstruction of the abdominal end of the thoracic duct by diathermy in 62 male rabbits. Lymphovenous communications were found in all of 50 rabbits studied: on the right side of the inferior vena cava in 47 cases, at the level of the left renal vein in 6, and at the level of the left lumbar vein in 1. In all cases, lymph passed into the venous system through a lymph node, and was not due to increased pressure during injection. The liver biopsy showed sclerosis of Glisson's capsule in 11 of 25 cases, lymphangiectasis in 11 and lymphoid infiltration in 5; the lymphatic aneurysms were in the portal spaces in 9 cases and on the Glisson's capsule in 2. The pancreas showed a normal parenchyma in 21 of 22 animals, the last one showing mild lymphangiectasis. The small intestine showed diffuse lymphangiectasis in 24 of 26 cases, mainly in the lymphatic vessels of the villi; one other case showed sclerosis and 5 showed lymphoid infiltration, but the intestinal mucosa was consistently normal.

2974 **STUDIES IN INTESTINAL HEALING: III. OBSERVATIONS ON EVERTING INTESTINAL ANASTOMOSES.** *(E.)* Ravitch, M. M. (Dept. Surg., U. Chicago, Ill.), F. Canalis, A. Weinshelbaum and J. McCormick. *Ann. Surg.* 166(4):670-680, 1967.

Since preliminary studies had shown that a cut intestinal segment can be sealed successfully by a mucosa-to-mucosa closure maintained with through-and-through sutures or staples, attempts were made to apply this technique to the creation of end-to-end, mucosa-to-mucosa, everting intestinal anastomoses. Based on experiments in a large number of dogs, in which the effectiveness of everting anastomoses constructed with either interrupted silk mattress sutures or the Russian ASTS 20 vascular stapler was compared with that of inverting anastomoses (open or closed) prepared with interrupted or continuous silk mattress sutures, or with a double layer of sutures–one of a catgut and one of silk, it is concluded that everting anastomoses with a single row of mattress sutures parallel to the everted edge or with a single row of metal staples heal as well as inverting anastomoses. With either type of anastomosis, the suture line is almost always disrupted if the region of the anastomosis is lightly wrapped with a sheet of foreign material such as fine silastic gauze; this effect is not prevented by treatment with antibiotics. The immediate histologic appearance of everting anastomoses is superior to that of the inverting type in terms of absence of intrusion upon the lumen, minimal inflammation, and closer apposition of the anastomosed surfaces. Necropsy studies after intraarterial injection of India Ink showed that arterial anastomoses across the suture line occur sooner in everting than inverting anastomoses. Peritoneal adhesion formation, which is one of the main factors in healing, is also greater with everting anastomoses. However, despite the early preponderance of inflammation in the inverting anastomoses, studies after several weeks showed essentially stable and complete healing in such anastomoses at a time when everting anastomoses still showed an inflammatory response and incomplete mucosal healing. Since everting anastomoses are technically simpler, especially with mechanical stapling devices, and mechanically superior, further work is urged to solve the problems of delayed mucosal union and external adhesions. In the discussion to this paper, Dr. W. H. Moretz warned, on the basis of his experiments, that everting anastomoses may show an increased tendency to leak, and Dr. C. Dennis pointed out that such anastomoses do not grow, so that their creation in infants may lead to stenosis in later life.

2975 **DETERMINANTS OF HUMAN TUMOR SENSITIVITY TO FLUORINATED PYRIMIDINE**

CHEMOTHERAPY. *(E.)* Wolberg, W. H. (U. Wisconsin Med. Ctr., Madison). *Ann. Surg.* 166(4):609-623, 1967.

Among 114 cancer patients in whom the incorporation of tritiated thymidine and uridine into tumor DNA, and the effect of 5-fluorouracil and 5-fluoro-2′-deoxyuridine on this incorporation, could be studied *in vitro* before the beginning of chemotherapy with the same two agents (at least 2 courses of rapid daily i.v. injections to an endpoint of early toxicity), there were 28 with adenocarcinoma of the colon or rectum, 9 with stomach cancer, 3 with pancreatic tumors and 1 each with cancer of the liver and gallbladder. A response to chemotherapy (either maintenance of the status quo or tumor regression) was seen in the gallbladder cancer, 3 cases of stomach cancer and 6 of colorectal cancer, and of these 10 tumors, 3 showed decreased thymidine and uridine uptake under the influence of the drug *in vitro*, 4 showed a decrease in uridine uptake and no change or an increase in thymidine uptake, and 3 showed increased thymidine uptake with no uptake of uridine. There was no correlation between the site of origin of the tumors and the nucleoside uptake, nor between the nucleoside uptake and the rate of tumor growth ("tumor aggressiveness"). In the entire group of 114 tumors, 75 (66%) showed a close correlation between the *in vivo* and *in vitro* results. Thus, a clinical response was obtained in 5 of 5 tumors showing decreased uridine and thymidine uptake *in vitro* and in 8 of 9 showing decreased thymidine and no uridine uptake or decreased uridine and no change in thymidine uptake, compared to 0 of 61 with either no uptake or no change in both thymidine and uridine, or an increase in the uptake of one with no change in the other. There were also clinical responses, however, in 16 of 39 tumors in the "indeterminate" group in which there was increased thymidine uptake *in vitro* with either a decreased or no uridine uptake; responses were obtained, for example, in 9 of 17 cases in which thymidine uptake was increased while uridine uptake was decreased under the influence of the same drug *in vitro*. It is concluded that the sensitivity of human tumors to antimetabolite treatment is determined by the type of pyrimidine anabolic enzymes present in the tumor cells. Sensitive tumors have the enzymes needed to transform fluorouracil or fluorodeoxyuridine into the monophosphate, and have a thymidylate or uridylate synthetase which is inhibited by the fluorinated analogs.

2976 **PRIMARY SCLEROSING CHOLANGITIS, THE BILIARY TREE, AND ULCERATIVE COLITIS.** *(E.)* Thorpe, M. E. C. (Royal Free Hosp., London, England), P. J. Scheuer and S. Sherlock. *Gut* 8(5):435-448, 1967.

The clinical and pathological features of primary sclerosing cholangitis as a complication of ulcerative colitis are discussed on the basis of 4 cases (2 men and 2 women, 34-45 yr old). The findings indicate that this is a generalized biliary disease which can affect both intra- and extrahepatic ducts as well as the gallbladder; sclerosing cholangitis and pericholangitis may in fact be part of a single disease process involving all or part of the biliary apparatus in ulcerative colitis. The cause of this disease is unknown. In these 4 cases, symptoms of colitis preceded the onset of cholestatic jaundice by 1 week to 10 yr (in the 2 with a 10-yr interval, the ulcerative colitis had been inactive for 6-7 yr at the time jaundice developed). Subsequent attacks of colitis and jaundice were related in only 1 of 4. Treatment of colitis (in the 2 active cases only) included codeine, steroids and sulazopyrine. After the onset of jaundice, 3 of 4 received surgical treatment with good results, while 1 patient had recurrent cholangitis, jaundice and diarrhea despite treatment with steroids and antibiotics. One of the 3 surgical cases was treated successfully with tetracycline and sulfatriad for recurrence, while 1 died in terminal jaundice 11 yr postoperatively. Operative cholangiography in 3 cases examined showed both intra- and extrahepatic duct involvement, with obstruction or constriction of the common bile duct and a lack of normal branching of the intrahepatic ducts. In all 4 cases the common bile duct was involved by a chronic fibrosing inflammatory process, with poorly defined aggregates of lymphocytes and frequent plasma cells. Sections of gallbladder showed inflammatory changes in all 3 cases examined. The liver presented a variety of histological features, ranging from subacute hepatitis to obstructive cholestasis, with or without nodular biliary cirrhosis, and hepatic fibrosis; necropsy revealed carcinoma of the right hepatic duct in 1 case. It is concluded that the diagnosis of sclerosing cholangitis can only be made at laparotomy, since its differentiation from other intrahepatic biliary diseases or large duct pathology is impossible on the basis of clinical and laboratory findings. The diagnosis should be confirmed by operative cholangiography and duct biopsy. The prime requisite of treatment is decompression of the biliary tree to relieve obstruction. Medical treatment is useful in controlling cholangitis episodes but is ineffective in altering the course of the disease process. The prognosis, however, is considerably better than first thought and many patients may remain asymptomatic for several years.

2977 **CARCINOID TUMORS AND THE CARCINOID SYNDROME.** *(E.)* Barreto, A. (Ashford Med. Ctr., San Juan, Puerto Rico). *Amer. J. Gastroent.* 48(2):125-134, 1967.

Among 32 patients (24-81 yr old) with carcinoid tumors seen at the Bronx V.A. Hospital between 1938 and 1963 (representing an incidence of 0.03% of all operations and autopsies), 6 had duodenal or ileal tumors, 12 had rectal carcinoids, and 9 (all in the age range 24-38 yr) had carcinoids primary in the appendix; other sites were the mesentery, colon, stomach, and lung. Only 8 of 32 had malignant carcinoids with metastatic spread, but it is emphasized that there is no way of distinguishing histologically between a benign and a premalignant carcinoid. Two patients, both with small bowel tumors, had the full-blown carcinoid syndrome, while in 12 cases the carcinoid presented as an acute abdomen (8 of 12 as acute appendicitis and 4 as intestinal obstruction). Associated malignancies were found in 5 cases, and peptic ulcers in 4. Following a review of the diagnosis, symptoms, pathology and surgical treatment of carcinoid tumors, 3 cases are presented in detail: 2 men (80-yr-old Caucasian and 55-yr-old Negro) with a carcinoid syndrome due to metastatic malignant carcinoids, and a 38-yr-old Negro man with a benign duodenal carcinoid involving the ampulla of Vater and the pancreatic ducts, and resulting in pruritus and jaundice. This patient has survived 12 yr following simple local excision.

2978 **STUDIES ON TOTAL BODY POTASSIUM IN INFANTILE MALNUTRITION: THE RELATION TO BODY FLUID SPACES AND URINARY CREATININE.** *(E.)* Alleyne, G. A. O. (Med. Res. Council, U. West Indies, Kingston, Jamaica). *Clin. Sci.* 34(1):199-209, 1968.

Serial studies of total body potassium (TBK), body fluid compartments, and 24-hr urinary creatinine during treatment for protein-calorie malnutrition in 28 children (7-21 months old) revealed generally low potassium values (21.4-49.6 mEq/kg), especially in those with clinical edema (21.4-39.2, mean 31.9 mEq/kg), and a direct correlation between TBK and the intracellular potassium. Potassium values rose with recovery, except in the child with the lowest intracellular K level, who died of a respiratory infection. The total body water (as measured with tritiated water) was increased initially and fell with recovery, the changes being accounted for entirely by changes in extracellular fluid volume (corrected bromide space). In children who had recovered from the acute phase (TBK all >40 mEq/kg), there was a linear correlation between the TBK and the 24-hr urinary creatinine. Calculations of the contribution of muscle potassium to TBK from the creatinine data, based on the usual assumptions, gave a figure of 33% and lead to the conclusion that in children recovering from malnutrition, alterations in muscle protein turnover alter the figures usually cited for the relation between urinary creatinine and muscle mass. TBK was found to be more closely correlated with body weight than with height, but more closely with height than with the cube of the height.

2979 **IMMUNOGLOBULIN CONTENT OF INTESTINAL MUCOSAL PLASMA-CELLS IN ATAXIA TELANGIECTASIA.** *(E.)* Eidelman, S. (Dept. Med. U. Washington, Seattle) and S. D. Davis. *Lancet* 1(7548):884-886, 1968.

The immunoglobulin content of intestinal plasma-cells and serum-immunoglobulin concentrations were studied in 6 children with ataxia telangiectasis and 17 immunologically normal children of similar age (5-16 yr). The former group commonly has a marked deficiency of serum immunoglobulin A (IgA). Multiple rectal suction-biopsies were obtained from all subjects. Prepared γ-globulin fractions of antisera were separated and conjugated with fluorescein isothiocyanate. All patients with ataxia telangiectasia had very low serum IgA concentrations, and either normal or high serum immunoglobulin M (IgM) concentrations. Central subjects had normal serum protein patterns. All subjects had negative Schick tests and appropriate isohemagglutinin titer. There was no apparent difference in the number of plasma-cells in histological studies of the two groups. The ratio of IgA to IgM fluorescent cells in the ataxia telangiectasia group averaged 0.12 (0.02-0.54) compared to an average of 8.1 (2.9-33.5) in the control group. IgA is the predominant immunoglobulin in normal intestinal mucosal plasma cells in children aged 5-16, as has been previously shown to be true for adults. The intestinal mucosa plasma cells of the ataxia telangiectasia patients differed in having predominantly IgM. The pathogenesis is not clear. Malfunction of a local immunological system may be a factor in the severe recurrent infections suffered by patients with ataxia telangiectasia.

2980 **DISACCHARIDASE ACTIVITIES OF THE ATROPHIC GASTRIC MUCOSA WITH INTESTINAL METAPLASIA.** *(E.)* Launiala, K. (U. Helsinki, Finland) and M. Siurala. *Scand. J. Gastroent.* 3(2):160-162, 1968.

Gastric suction biopsies were obtained for histological and disaccharidase activity studies in 9 patients with histories suggestive of atrophic gastritis. Three had diffuse intestinal metaplasia, 3 had pseudopyloric metaplasia, and 3 had normal gastric mucosa. Disaccharidase activities were determined by a modification of Dahlqvist's method and compared with activities from normal jejunal mucosa. Activities in gastric mucosa with intestinal metaplasia were higher than those in normal and atrophic mucosa without intestinal metaplasia, but only one-tenth of those found in normal jejunal epithelium. The differences in disaccharidase activities were so great as to suggest lower activity per intestinal metaplastic cell compared to the normal jejunal mucosal cell. This implies a comparatively lower functional capacity of intestinal metaplastic cells.

2981 **GALLSTONE OBSTRUCTION OF THE DUODENAL BULB.** *(E.)* Simonian, S. J. (Dept. Path., Harvard Med. Sch., Boston, Mass.). *Lancet* 1(7548): 893-894, 1968.

This is the first report from Britain of gallstone obstruction of the first portion of the duodenum (Bouveret's syndrome). A 74-yr-old woman with a 20 yr history of biliary symptoms presented with epigastric pain, vomiting, and constipation. Clinical diagnosis was acute obstruction secondary to pyloric stenosis, with X-rays suggestive of tumor at this level. The patient recovered from surgical removal of a 6 x 4 x 4 cm gallstone in the duodenal bulb. Re-examination of the preoperative film showed a radiolucent calculus and contrast material in a cholecystoduodenal fistula and in the gallbladder. Postoperative X-rays showed the fistula to be healing.

2982 **PYREXIA AND ELEVATED ERYTHROCYTE SEDIMENTATION RATE IN ACUTE GASTRODUODENAL HEMORRHAGE.** *(E.)* Chapman, R. S. (Dept. Mat. Med. & Therap., U. Aberdeen, Scotland), S. D. Mohamed. *Postgrad. Med. J.* 44:238-241, 1968.

The erythrocyte sedimentation rate (ESR) was raised to 155 mm/hr or more in 36% of 258 cases of gastroduodenal bleeding. Of those showing elevated ESR, peak levels were recorded in the first week in 75% of cases, remaining elevated for 7-10 days in the majority of cases. Blood transfusion failed to have any significant effect on the ESR. Pyrexia (greater than 99F) was observed in 37% of 171 patients. Elevation of both the ESR and body temperature was recorded in 15% of 160 patients, although 55% of the patients showed one or the other abnormality. Neither the incidence of the pyrexial reaction nor the raised ESR was significantly different among the 3 groups with blood loss from chronic duodenal ulcer, chronic gastric ulcer, and acute gastric erosion. There was a dissociation between the incidence of pyrexia and the raised ESR and a lack of correlation between the severity of bleeding and the rise in the ESR.

2983 THE EFFECT OF X-IRRADIATION AND THERMAL BURN ON THE INTESTINAL MUCOSA. *(E.)* Baker, D. G. (Dept. Biol., Brookhaven Natl. Lab., Upton, N. Y.) and F. A. Valeriote. *Canad. J. Physiol. Pharmacol.* 46(3):533-536, 1968.

In experiments on male albino rats, the weight, nitrogen content and water content of segments of the duodenum, ileum and large intestine were determined 2-6 days after exposure to a 1-minute thermal burn and/or 700-750 r of whole-body X-irradiation (70 r/min), and in similar rats given tritiated thymidine before sacrifice, the crypt cell count, labeling index, mitotic index and mean grain count were determined 4 days after radiation injury. Thermal burns alone produced a significant increase in mucosal weight on days 4 and 6 in the duodenum only, while X-irradiation alone produced a decrease in mucosal weight in all segments by day 2 and a marked increase in the duodenum by days 4-6. After a combined injury, the initial decrease was greater and the recovery was more rapid. The nitrogen content of the intestinal mucosa showed a parallel behavior, with a maximal decrease of 75% of control values, but there was no significant effect on the water content. Four days after thermal injury alone, the crypt cell population was decreased, but the labeling and mitotic indices in the small intestine indicated a trend toward recovery. Four days after X-ray alone, the crypt cell population and labeling index were increased, indicating overcompensation, but the mitotic index was decreased. A combined injury was followed by a response which was qualitatively similar to but greater than the response to radiation alone. Since combined injury produced no significant decrease in intestinal mucosal mass or crypt cell population beyond that produced by X-ray alone, it is concluded that the increased early (3-8 day) mortality following combined injury is not due to increased damage to the intestine or delay in the replacement of mucosal tissue. It is suggested that the lethal effect of combined injury may be due to functional impairment in the regenerating mucosal tissue or in some other critical system, such as the reticuloendothelial system.

2984 THRUSH BOWEL INFECTION: EXISTENCE, PREVENTION AND TREATMENT, PARTICULARLY BY A *LACTOBACILLUS ACIDOPHILUS* PREPARATION. *(E.)* Alexander, J. G. *Curr. Med. Drugs* 8(4): 3-11, 1967.

Experience with 19 cases of chronic diarrhea (11 children, 2-26 months old, including 5 with suspected celiac disease, and 8 adults, 25-76 yr; 7 males and 12 females) lasting 1-24 months, with positive fecal cultures for *Candida albicans* and a good response to antifungal therapy (Enpac and/or nystatin), indicates that thrush infection of the bowel is a valid clinical entity which can be alleviated, at least temporarily, by drug therapy. Relapses were noted in only one of the 11 children but in 5 of 8 adults. On the other hand, among 30 children with post-antibiotic diarrhea and positive fecal cultures for *C. albicans*, all recovered rapidly without treatment after discontinuation of the antibiotic. It is also pointed out that positive fecal cultures can be obtained in the absence of bowel symptoms, which seem to be caused by intestinal hypersensitivity to *Candida*. In a controlled clinical trial of Enpac (a preparation of antibiotic-resistant *Lactobacillus acidophilus*), the drug was given to half of 140 patients with gastroenteritis who were being treated with broad-spectrum antibiotics. No post-antibiotic diarrhea developed in either the Enpac or the control group. However, clinical improvement in 9 of 20 moderately severe cases receiving Enpac was judged to be more rapid than could have been expected, and several cases showed inhibition of intestinal *Salmonella*, *Shigella* and *E. coli*. Further trials of *L. acidophilus* in the prevention of post-antibiotic moniliasis and diarrhea are urged.

2985 EFFECT OF X-IRRADIATION ON HOST RESISTANCE TO THE DWARF TAPEWORM. *(E.)* Coleman, R. M. (Dept. Biol., Boston Coll., Chestnut Hill, Mass.), J. M. Carty and W. J. Fimian, Jr. *Proc. Soc. Exp. Biol. Med.* 126(2):371-374, 1967.

Among Swiss Webster ICR female mice exposed to 450 r (34 r/min at a distance of 94 cm) of whole-body X-irradiation and infected 24 hr later with the dwarf tapeworm (approximately 10,000 eggs of *Hymenolepis nana* intragastrically), survival to 21 days was only 54.5% compared to 83.3% in mice subjected to irradiation alone (infection with the dwarf tapeworm is not lethal in nonirradiated mice). After 650 r, the survival rates were 19.4% and 24.2% in infected and uninfected animals, resp. Comparison of irradiated and nonirradiated infected mice at autopsy at 21 days revealed larger worm loads in the former (595-718 worms/animal compared to 398-475), while a follow-up of 6-9 weeks indicated more persistent infections in irradiated mice, but no autoinfection. Irradiated animals also showed decreased immunity to *H. nana*, as revealed by lower titers in the indirect hemagglutination reaction and a reduced incorporation of ^{14}C-lysine into anti-worm globulins. Streptomycin therapy (300 μg/g/day i.p.) increased the survival rate of irradiated (450 r) mice to 87.5% for infected animals and 95.8% in uninfected animals. Although blood cultures revealed no significant difference in the incidence of bacteremia following irradiation in infected and uninfected mice, it is postulated that streptomycin prevents, in some way, the apparent synergism between the intestinal flora and the tapeworm. It is concluded that irradiation results in disruption of the cellular and humoral defense mechanisms to tapeworm infection.

2986 SARCOMA OF THE GASTROINTESTINAL TRACT. *(Ger.)* Rosolleck, H. (Israel Hosp., Hamburg, Germany). *Materia Med. Nordmark* 20(5):269-273, 1968.

Case reports are presented for 4 cases (all female, 29-68 yr old) of gastrointestinal sarcoma encountered in the author's hospital in a 4-yr period, including 2 sarcomas of the stomach, one of the gallbladder and one of the jejunum. Although the presence of a malignancy was diagnosed preoperatively in 3 of 4 (the 4th being operated for intermittent ileus), the histological diagnosis of sarcoma could only be made by the pathologist. The symptoms and postoperative course in these patients were not significantly different from those in carcinoma. The 2 women (51-63 yr old) with gastric sarcomas had abdominal symptoms for 7-12 months, and one had originally been treated for ulcer; this patient, found to have a lymphosarcoma, died 20 months after subtotal gastrectomy with proximal gastroenterostomy and a Braun's anastomosis. The other woman, with a round-cell sarcoma, was in good condition 15 months after a Billroth II operation; this patient, who had diabetes and had previously had a cholecystectomy, had been treated by surgery and radiation for cancer of the uterine cervix 15 yr earlier, and by X-ray for a reticulosarcoma of the tonsil just 2 months before. A 68-yr-old woman with a 2-yr history of "cholelithiasis" and obstructive jaundice, and increasing colic for 1-2 months preoperatively, was found after cholecystectomy to have a double tumor: an adenocarcinoma of the gallbladder combined with a round-cell sarcoma of the outer wall; this patient died in 23 days after development of a fistula. A 29-yr-old woman with symptoms of appendicitis 1 yr previously (temporarily alleviated by appendectomy) remained in good health 3 yr after surgery for reticulosarcoma of the jejunum. The point is made that in the case of the small intestine, most of the very rare malignancies seem to be sarcomas rather than carcinomas.

2987 A CONTRIBUTION TO THE TREATMENT OF DIGESTIVE INSUFFICIENCY. *(Ger.)*

Lindewirth, H. P. (Evangelical Hosp., Oberhausen, Rhld., Germany). *Z. Ther.* 6(4):211-214, 1968.

"Combizym compositum" (coated tablets containing 120 mg of an enzyme concentrate from *Aspergillus oryzae*, 400 mg of pancreatin and 60 mg of dried purified ox bile) was used in the treatment of 93 patients with digestive disorders of varying etiology, including 34 with hepatic disease, 14 with gallbladder disease, 2 with pancreatic disease, 2 with colitis, 8 with chronic meteorism and constipation, 3 with the Roemheld syndrome, 1 tubercular patient with PAS intolerance, and 29 with dyspepsia of old age. The usual dose was 1 tablet t.i.d., except in cases of constipation where 2 tablets t.i.d. was given initially, soon reduced to 1 tablet b.i.d. plus 2 tablets in the evening. The results were very good in 53 (including 7 with dyspepia of old age), good (dietary restrictions necessary) in 30, and unsatisfactory in 10 (including 7 with dyspepsia of old age). The results in dyspepsia of old age were subsequently improved by increasing the dosage. The only side effect was transitory nausea in one autonomically labile patient with pancreatic disease.

2988 INTESTINAL MUCOSAL FUNCTION AND STRUCTURE IN THE STEATORRHEA OF ZOLLINGER-ELLISON SYNDROME. *(E.)*

Mansbach, C. M. (Duke U. Med. Ctr. and Vet. Admin. Hosp., Durham, N. C.), R. M. Wilkins, W. O. Dobbins and M. P. Tyor. *Arch. Intern. Med.* 121(6):487-494, 1968.

Gastric secretion, intestinal absorption, and mucosal histological changes due to steatorrhea were investigated in 2 Zollinger-Ellison syndrome patients studied for a 2- to 4-yr period. Gross hyperacidity was noted in both patients, with relief given to patient 2, a 34-yr-old female, after gastric irradiation. Fecal fat levels, as indices of intestinal absorption, were markedly altered in patient 1, a 41-yr-old male, while patient 2, exhibited only modest to minimal steatorrhea. Low ^{14}C-palmitate incorporation into intestinal mucosal triglyceride was observed in patient 1 and low normal values were seen in patient 2. Progressive gastric surface mucus cell metaplasia was demonstrated in duodenum and jejunum biopsy specimens obtained from patient 1; under the electron microscope, all villous epithelial cells were structurely abnormal and easily distinguished from intestinal absorptive cells seen in normal controls. The metaplastic cells contained numerous membrane-bound secretory droplets, sparse microvilli, markedly increased ribosomes, fibrils, granular endoplasmic reticulum, prominent lateral cell membrane interdigitations, and sizable Golgi complexes. Although the first two small intestine biopsy specimens were normal in patient 2, progressive changes were subsequently noted. The first alteration was lamina propria edema, followed by villi shortening and change of villous epithelium to cuboidal cells. Other changes included increased basophilia, absorptive cell vacuolization with prominent cell extrusion zones, and lamina propria infiltration by plasma cells, lymphocytes, eosinophils and polymorphonuclear neutrophils. Electron microscopic changes included endoplasmic reticulum dilatation, microvilli sparsity, and prominent lysosomes. Patient 1 showed marked impairment of mucosa neutral amino acid concentration and long-chain fatty acid esterification; in patient 2, mucosal basic amino acid concentration was impaired. The results support the idea that the basic amino acid transport system is more susceptible to mucosal injuries. It is concluded that structural and functional mucosal defects, as exhibited in these 2 patients are partly responsible for lipid malabsorption.

2989 TREATMENT RESPONSE IN WHIPPLE'S DISEASE. *(E.)*

Golden, D. (Misericordia Hosp., Bronx, New York) and M. Luthra. *Amer. J. Gastroent.* 49(6):478-483, 1968.

The clinical findings and case history of a 59-yr-old male with Whipple's disease are presented; diagnosis was confirmed by laboratory analyses, radiological studies and jejunal biopsy. The patient had suffered from general weakness and watery diarrhea 5 months prior to diagnosis. Radiological examination revealed small bowel loop dilatation and hypomotility; mucosal edema was also evident. Hepatomegaly was observed upon liver palpation. Hemotoxylin-eosin and periodic acid Schiff (PAS) staining of jejunal biopsy specimens revealed changes diagnostic of Whipple's disease; clubbed and thickened villi and macrophages abundant with PAS-positive material in the submucosa and mucosa above the lamina propria were observed. Oral prednisone (40 mg/day) alone failed to relieve the symptoms, but prednisone in combination with tetracycline (1 g/day) quickly brought about remission. After 2 months of treatment, prednisone was gradually discontinued without evidence of relapse. The patient, upon recent reexamination, showed persistent hepatomegaly, but improvement in appearance, general health, small bowel motor function, and villous blunting were noted. Repeated jejunum biopsy showed no significant changes in foam-laden macrophages or PAS-positive staining material. The patient remains asymptomatic after 9 months of tetracycline therapy (750 mg/day).

2990 INVOLVEMENT OF THE GASTROINTESTINAL TRACT BY PROGRESSIVE SYSTEMIC SCLEROSIS. *(E.)*

Cassada, W. A. (Med. Coll. Virginia, Richmond), R. H. Armstrong Jr. and M. P. Neal Jr. *Southern Med. J.* 61(5):475-481, 1968.

The radiologic findings characteristic of the gastrointestinal lesions of scleroderma are described in detail and it is pointed out that over 10% of the patients may have gastrointestinal symptoms before the appearance of any cutaneous lesions. These symptoms are most commonly referrable to esophageal involvement, rarely to involvement of the colon. The histopathologic findings in the digestive tract (edema manifested by an increase in ground substance, followed by thickening of the submucous layer due to proliferation of collagenous fibrous tissue and eventual atrophy of the smooth muscles of the inner circular layer of the muscularis) are often difficult to interpret. Radiologically, however, involvement of the esophagus, stomach and/or intestine yields characteristic signs which can be valuable in diagnosis. Esophageal involvement results in decreased peristalsis and dilatation of the atonic esophagus, with the loss of its intraluminal longitudinal folds. This results in gastroesophageal reflux, stasis of acid gastric contents, and esophagitis with eventual shortening and stricture formation. The radiological findings in the stomach are not striking, although many patients show decreased peristalsis and delayed gastric emptying. In the small bowel, X-ray sometimes reveals striking dilatation of the descending and proximal transverse duodenum, suggesting obstruction, while the jejunum and ileum appear hypomotile with varying degrees of dilatation and pseudosacculation. Intestinal transit time is prolonged. Involvement of the colon is not as rare as sometimes thought, producing saccular deformities of the colonic wall, especially along the antimesenteric side of the transverse and descending colon. Inspissated fecal material is usually present in these sacculations. In advanced cases, the colon dilates, becoming atonic, and the sacculations disappear.

2991 DIGESTIVE DISEASE AS A NATIONAL PROBLEM. VI. ENTERIC DISEASE AMONG UNITED STATES TROOPS IN VIETNAM. *(E.)* Sheehy, T. W. (U. Alabama Med. Ctr., Birmingham). *Gastroenterology* 55(1): 105-112, 1968.

Among the personnel of the U.S. Army in South Vietnam in 1966, 70% of all hospital admissions were for disease, 15% (86.6/1000/yr) for battle injuries, and 15% (75.3/1000/yr) for nonbattle injuries. Among the diseases, fever of undetermined origin (71.6/1000) and diarrhea/dysentery (60.7/1000) were the most common, followed by malaria, respiratory infections, skin diseases, neuropsychiatric illness, infectious hepatitis (4.8/1000), venereal disease, dengue and typhus. In 1965-67, enteric diseases accounted for 11.8-19.5% of all disease, 8.3-14.3% of all hospital admissions, and 5% of all clinic visits. In 1966, it is estimated that diarrhea and viral hepatitis, resp., were responsible for 25,400 and 20,100 man-days of hospitalization in Vietnam. In the first half of 1967, there were 10,022 admissions for fever of undetermined origin, compared to 34 for food poisoning, 169 for dysentery, 471 for amebiasis, 900 for viral hepatitis, and 6610 for other enteric infections. The bacterial diarrheas are no longer very important (morbidity of 0.12%/yr for shigellosis) and no cases of typhoid or cholera have been reported among military personnel, despite the prevalence of these diseases among the South Vietnamese. The reported incidence of amebic dysentery is about 0.2%, but it may be more common since amebic liver abscess is increasing. Giardiasis and intestinal worms may be found in 8 and 15% of all nonsymptomatic returnees from Vietnam, resp. Tropical sprue may also be more common than generally suspected; for example, intestinal absorption and biopsy studies in 75 returned veterans revealed jejunitis in 21 (10 of whom had abnormal xylose absorption) and typical mucosal lesions of sprue in 3. Leptospirosis is rare, but viral hepatitis has an incidence of 0.41-0.67% in Vietnam compared to 0.03-0.05% among American personnel in Europe and 0.05-0.09% in the United States. The course of this disease is usually mild. Peptic ulcer is also quite common among U.S. Army personnel in South Vietnam, the number of ulcer patients often exceeding the combined number with amebic and bacillary dysentery. Some of the problems posed by the diagnosis, prophylaxis and treatment of these diseases under Vietnamese conditions are discussed.

2992 COMPARATIVE STUDIES OF THE EFFECT OF ASPIRIN AND SODIUM SALICYLATE ON THE FREQUENCY OF GASTROINTESTINAL BLEEDINGS. *(E.)* Florkiewicz, H. (Med. Acad., Lublin, Poland), B. Kolber-Postepska and T. Widomska-Czekajska. *Pol. Med. J.* 7(2):308-314, 1968.

The benzidine and pyramidon tests were performed in 15 sodium salicylate-treated patients (14-61 yr of age) and 15 aspirin-treated patients (15-68 yr of age) to confirm resultant gastrointestinal bleeding; the drugs were administered postprandially, in powdered form, for the treatment of rheumatoid arthritis and rheumatic fever. Fecal blood, gastric juice analysis, bleeding and clotting time, prothrombin level, platelet count, hemoglobin, plasma alkaline reserve, bilirubin, and total protein were measured before and after treatment. 17-Hydroxysteroids were determined to define the role of the adrenals in salicylate-induced gastrointestinal bleeding. Benzidine and pyramidon tests were positive in 40% of sodium salicylate-treated and 73% of aspirin-treated subjects; more gastrointestinal bleeding occurred in the aspirin-treated subjects. No significant difference was observed in steroid excretion, uropepsinogen activity, gastric acidity, and pepsin activity; bleeding and clotting time, prothrombin level, platelet count, total protein, bilirubin and plasma alkaline reserve were unaffected by treatment. There was a statistically significant increase in serum pepsinogen activity in aspirin-treated patients and the number of eosinophils in both groups. Sodium salicylate induces gastrointestinal bleeding less frequently than aspirin; the toxic effects of these drugs are directed at the gastric mucosa. No drug effect on adrenocortical function was noted. Increase in the number of eosinophils reflects the effect of the allergic factor.

2993 IMMUNOCHEMICAL MEASUREMENT OF ELEVATED LEVELS OF GASTRIN IN THE SERUM OF PATIENTS WITH PANCREATIC TUMORS OF THE ZOLLINGER-ELLISON VARIETY. *(E.)* McGuigan, J. E. (Washington U. Sch. Med., St. Louis, Missouri) and W. L. Trudeau. *New Eng. J. Med.* 278(24):1308-1313, 1968.

Serum gastrin levels were measured in 4 Zollinger-Ellison syndrome patients and in 24 hospital patients without gastrointestinal disease; the patients were fasted at least 8 hr and blood samples drawn and analyzed for gastrin by the radioiodine immunoassay. Serum gastrin levels ranged from 245 to 668 pg/ml for the control subjects; Zollinger-Ellison syndrome patients had serum gastrin levels between 3500 and 62,000 pg/ml. The difference between the two groups was statistically significant. Gastrin was identified immunochemically in the pancreatic islet-cell tumor from one patient; the amount of gastrin measured was 1.05 μg/g of tumor tissue.

2994 ROLE OF ASCITES IN GASTROESOPHAGEAL REFLUX WITH COMMENTS ON THE PATHOGENESIS OF BLEEDING ESOPHAGEAL VARICES. *(E.)*

Simpson, J. A. (VA Hosp., West Haven, Conn.) and H. O. Conn. *Gastroenterology* 55(1):17-25, 1968.

Esophagogastric pressure and pH measurements were carried out by means of a triple catheter, consisting of 2 terminally-sealed, water-filled polyethylene catheters having lateral orifices 5 cm apart and a 3rd tube with a terminal glass pH electrode, in 45 fasting, supine, male patients (33-73 yr old), including 3 controls without liver or esophagogastric disease, 6 noncirrhotic patients with sliding hiatus hernia, and 36 patients with Laennec's cirrhosis. None of these 45 patients had bled from the gastrointestinal tract. Among the 36 with cirrhosis, 16 patients had ascites (defined as mild in 6, moderate in 2, and massive with tense abdominal distension and an obvious fluid wave in 8), 22 had esophageal varices (including 8 of the 16 with ascites and 14 of the 22 without ascites), and 6 had a hiatus hernia (including 4 patients with ascites and 2 without). Gastroesophageal reflux, defined as an abrupt decrease in esophageal pH from 6.0-7.0 to below 3.0, persisting for at least 30 seconds, was observed either at rest or after a cough or Valsalva maneuver in 9 cases, including 3 of the 6 noncirrhotic patients with hiatus hernia and 6 of the 36 with cirrhosis (5 with massive ascites and 1 with no ascites but a hiatus hernia). The inferior esophageal sphincter averaged 4.2-4.5 cm in length in all groups of patients except those with hiatus hernia and no cirrhosis, where it averaged 5.0 cm regardless of the presence of reflux. The intragastric pressure increased markedly in cirrhotic patients with massive ascites (to 20 mm Hg compared to 13.6 in patients with mild-moderate ascites, 9.2-9.3 in hiatus hernia or cirrhosis without ascites, and 6.0 in controls), and the esophageal-gastric pressure gradient showed a similar pattern. The abdominal-segment-gastric pressure gradient, on the other hand, tended to fall with increasing ascites, but there was no correlation between the intragastric pressure and reflux. All 3 subjects studied again after the disappearance of ascites showed a decrease in intragastric pressure and 2 of 3 showed disappearance of reflux, but reflux persisted despite a decrease in intragastric pressure in 1 patient with hiatus hernia. These observations suggest that the high intragastric pressure caused by tense ascites may lead to gastroesophageal reflux. Although reflux is not the major precipitant of bleeding from esophageal varices, which is more commonly related to portal hypertension, it may play a prominent role in some instances of variceal hemorrhage which are caused by erosion.

2995 SARCOMAS AND MULTIPLE POLYPOSIS IN A KINDRED: A GENETIC VARIETY OF HEREDITARY POLYPOSIS? *(E.)*

Fraumeni, J. F. (Natl. Cancer Inst., Natl. Inst. Health, Bethesda, Md.), C. L. Vogel and J. M. Easton. *Arch. Intern. Med.* 121(1):57-61, 1968.

The case histories of 4 family members, the father and 3 sibs, with associated polyposis coli and extra-alimentary sarcomas are presented; the condition may be a variant of Gardner's syndrome, with polyposis coexisting with malignant rather than benign tumors of mesenchymal origin. Only the proband in the series had the fully developed entity, with, both colonic polyposis and sarcoma. The father died of pulmonary osteosarcoma, 1 child of retroperitoneal liposarcoma, and 1 child of colonic carcinoma with multiple polyposis; all 3 sarcomas may have been derived from an underlying mesenchymal defect. The clinical picture suggests the activity of a gene which is separate from those which cause either familial polyposis or Gardner's syndrome.

2996 INTESTINAL INJURIES RESULTING FROM BLUNT ABDOMINAL TRAUMA IN CHILDREN.

(Ger.) Käufer, C. (Surg. Clin., U. Bonn, Germany) and D. Wülfing. *Z. Kinderchir.* 6(1):55-66, 1968.

Among 97 children treated for blunt abdominal trauma in the period 1951-67, 9 (8 boys and 1 girl, 5-15 yr old) sustained injuries to the gastrointestinal tract: rupture of the small intestine in 7 cases (mostly of the duodenum or duodenojejunal flexure), perforation of the sigmoid in 1 case, and tearing loose of the sigmoid and anus in 1 case. Most of these injuries were due to vehicular accidents (3 on bicycles, 2 on roller skates, 1 by automobile), 2 occurred while at play, and 1 child was kicked by a horse. The children were admitted 0.5-22 hr (most 1-3 hr) after the accident and were operated on 0.5-3 hr later (in 8 cases, 1 not being operated on until 51 hr after admission). Simple suture was sufficient in 7 cases (with drainage in 6), while 1 required resection of the small intestine with side-to-side anastomosis and 1 required construction of a sigmoid anus. All the operations were successful and the children were discharged in good condition 15-50 days postoperatively, despite concomitant rupture of the liver and pancreas in 1 case and multiple injuries with concussion in another. This compares with an overall mortality of 6% in the total group of 97 children, and of 13% among those with injury to abdominal organs. It is concluded that blunt trauma to the intestine in childhood is usually caused by a localized force. The prognosis depends on early diagnosis and treatment, which presents no problems in the case of intraperitoneal ruptures but can be difficult in cases with retroperitoneal rupture of the duodenum.

2997 ARTERIAL DISEASE OF THE GUT. *(E.)*

Watt, J. K. (Glasgow Royal Infirm., Scotland). *Brit. Med. J.* 3(5613):231-233, 1968.

Acute intestinal ischemia is caused by acute occlusion of superior mesenteric artery, due to atherosclerosis-induced thrombosis or embolism; superior mesenteric vein occlusion, due to cirrhosis, tumor compression, or portal or splenic vein thrombosis; and nonocclusive mesenteric ischemia due to congestive heart failure, digitalis intoxication, or severe hemoconcentration. The primary clinical features are pain, general pallor, hypotension, and tachycardia, followed by peritonitis and abdominal distention; the rate of deterioration depends on the bowel blood and fluid loss, the extent of bowel necrosis, the patient's fitness, and the bacterial proliferation rate. Inferior mesenteric artery occlusion also causes acute intestinal ischemia. It may be symptomless or present as transient hindgut ischemia, hemorrhagic colitis resembling acute ulcerative colitis, colonic atrophy with simple constriction, acute hindgut infarction with necrosis, or acute necrotizing hindgut colitis. Aortography or barium enema are used to confirm the diagnosis. Chronic intestinal ischemia is due to stenosis or occlusion of 1 or more of the 3 visceral arteries caused by atherosclerosis, constriction caused by the arcuate ligament of the diaphragm, fibrotic constriction of the celiac axis or superior mesenteric artery; aneurysmal aortic or visceral dilatation, or pancreatic tumors or other. The primary symptom of chronic intestinal ischemia is pain after eating, the degree of which varies with the size of the meal. Aortographic investigation should be undertaken to verify the diagnosis. Surgical treatment of both acute and chronic intestinal ischemia is preferred; embolectomy and/or bypass grafting, to revascularize the intestinal tract, are the recommended procedures. Revascularization of the superior mesenteric artery alone suffices for chronic ischemia; aortomesenteric bypass grafting is preferred with effective blood flow restoration being achieved by reimplantation of the superior mesenteric artery into the aorta. The prognosis of chronic ischemia is good depending on the degree of constriction and the natural history of the disease. The mortality rate of acute ischemia approaches 100% due to its rapid onset, gross necrosis, difficulty in diagnosis, and the extent of bowel involvement in most cases.

2998 **GASTROINTESTINAL HEMORRHAGE COMPLICATING CHRONIC HEMODIALYSIS.** *(E.)* Boner, G. (Government Hosp., Tel-Hashomer, Israel) and E. M. Berry. *Israel J. Med. Sci.* 4(1):66-68, 1968.

The case histories of 3 chronic pyelonephritis patients and 2 chronic glomerulonephritis patients undergoing maintenance hemodialysis showed that each suffered from gastrointestinal hemorrhage. Bleeding was attributed to duodenal ulcers in 3 patients; the cause of the bleeding was unknown in the other patients, 1 of whom died of hyperpotassemia and the other who underwent spontaneous recovery. Hemodialysis is likely to cause stress, and the occurrence of ulcers in treated patients is not surprising. Heparinization, usually performed for dialysis, is liable to precipitate hemorrhage. Regional heparinization is recommended in patients suspected of having peptic ulceration, to prevent gastrointestinal bleeding.

2999 **DECREASE IN NET STOOL OUTPUT IN CHOLERA DURING INTESTINAL PERFUSION WITH GLUCOSE-CONTAINING SOLUTIONS.** *(E.)* Hirschhorn, N. (Pakistan-SEATO Cholera Res. Lab., Dacca, Pakistan), J. L. Kinzie, D. B. Sachar, R. S. Northrup, J. O. Taylor, S. Z. Ahmad and R. A. Phillips. *New Eng. J. Med.* 279(4):176-181, 1968.

In 8 patients with cholera the rate of stool fluid loss was decreased significantly by intragastric or intestinal administration of electrolyte solutions containing glucose for periods of 12 to 32 hours. During alternating periods of perfusion without glucose or without any perfusion, fluid loss was not significantly different from that in 25 control patients with cholera. Galactose was as effective as glucose in reducing net stool output in 1 patient, whereas fructose had no effect in 2 patients. Oral electrolyte solutions containing glucose can reduce parenteral fluid requirements in the treatment of cholera.

3000 **INTRINSIC-FACTOR SECRETION ASSESSED BY DIRECT RADIOIMMUNOASSAY AND BY TOTAL-BODY COUNTING IN PATIENTS WITH ACHLORHYDRIA AND IN ACID SECRETORS.** *(E.)* Irvine, W. J. (Royal Infirm., Edinburgh, Scotland), D. R. Cullen, L. Scarth and J. D. Simpson. *Lancet* 7(7561):184-188, 1968.

Gastric analysis was performed in 282 fasting subjects, 145 of whom were acid secretors and 137 of whom were achlorhydric; 81 of the achlorhydria patients had pernicious anemia. Histamine (0.04 mg/kg of body weight) or pentagastrin (6 μg/kg) were given i.m. or i.v. Radioimmunoassay of gastric juice was done to determine intrinsic factor concentration; absorption of oral vitamin B_{12} was studied using a total body counter and ^{58}Co-vitamin B_{12}. Intrinsic factor and acid secretion were maximal 1 hr after histamine or pentagastrin stimulation in 10 patients studied; 3 patients had pernicious anemia, 1 had achlorhydria without pernicious anemia, and 6 were acid secretors. A correlation was seen between intrinsic factor and acid secretion in the acid secreting group; the subjects with the lowest intrinsic factor secretion had marked hypochlorhydria. The route of stimulus administration had no effect on the results obtained. A 50% incidence of pernicious anemia patients with detectable intrinsic factor antibodies was observed; the incidence was 5% in the nonpernicious anemia achlorhydric patients. The proportion of orally administered ^{58}Co-vitamin B_{12} retained in the body after 1 week was 1-23% in 12 pernicious anemia patients and 33-74% in 12 achlorhydria patients without pernicious anemia. Neither measurement of vitamin B_{12} absorption nor radioimmunoassay of intrinsic factor influence the manifestations of the disease process, thus, making them useful in studying atrophic gastritis.

3001 **SERUM γ-GLUTAMYL TRANSPEPTIDASE ACTIVITY IN VARIOUS INTERNAL DISEASES (EXCLUDING DISEASES OF THE LIVER AND GALLBLADDER).** *(Cz.)* Dimov, D. M. (3rd Clin. Int. Dis., Purkinje U., Brno, Czechoslovakia). *Vnitrni Lek.* 14(3):246-255, 1968.

Among 370 patients with various internal diseases (excluding cancer as well as all primary diseases of the liver and gallbladder) examined in the first 6 months of 1966, 75 showed definite increases in serum γ-glutamyl transpeptidase activity (values above 0.80 μmoles α-naphthylamine/ml serum/hr in women and above 1.50 in men). These 75 patients, in all of whom some hepatic lesion or pancreatic damage could be verified subsequently by clinical and laboratory tests, included 42 of 214 patients with cardiovascular disease (most of the positive cases presenting with cardiac decompensation and edema), 6 of 42 with respiratory tract disease, 2 of 47 with digestive disease (both with peptic ulcer), 6 of 21 with urogenital disease, 10 of 13 with pancreatitis, and 6 of 33 others (3 with diabetes and 1 each with infectious mononucleosis, leukemia and lymphogranuloma). Particularly high values (4.52-15.40 μmoles, av. 8.74) were obtained in 4 of 4 cases of acute pancreatitis, accompanied by elevations of most of the other serum enzymes. Elevated transpeptidase values were also obtained in 6 of 9 cases of chronic pancreatitis (0.16-11.2 μmoles, av. 2.88). The elevations in transpeptidase activity were sharper and persisted longer than the changes in the other serum enzymes, even amylase. The possible mechanism of these changes in serum transpeptidase activity is discussed.

3002 **SODIUM-POTASSIUM STIMULATED ADENOSINE TRIPHOSPHATASE OF THE SMALL INTESTINE OF MAN: STUDIES IN CHOLERA AND OTHER DIARRHEAL DISEASES.** *(E.)* Hirschhorn, N. (Thorndike Mem. Lab., Boston City Hosp., Mass.) and I. H. Rosenberg. *J. Lab. Clin. Med.* 72(1):28-39, 1968.

Homogenates of normal human jejunal and ileal mucosa were found to contain a triphosphatase (Na-K ATPase) which is stimulated by sodium and potassium, inhibited by ouabain, and probably plays a role in active sodium transport. Using a specially developed assay technique (homogenates in deoxycholate-Tris-EDTA incubated with ATP, Mg, Na and K at pH 7.4 and 37C), Na-K ATPase activity was then measured in peroral jejunal biopsy specimens from 21 patients (12-50 yr old) with cholera, acute nonspecific gastroenteritis, and bacterial enteritis. As compared to the convalescent values (biopsies taken 4-13 days after the last liquid stool), the Na-K ATPase activity was significantly decreased during the acute phase of all 3 diseases (biopsies taken 23-60 hr after onset), even though the unstimulated ATPase activity in the same specimens was essentially unchanged. Significant decreases in Na-K ATPase were observed in all 7 patients with acute nonspecific gastroenteritis (average decrease of 43%), all 5 patients with bacterial enteritis (average decrease 51%), and 7 of 10 patients with cholera (average decrease 29%). There were no significant clinical or histological differences between cholera patients with normal and those with decreased Na-K ATPase. In 8 other patients with nonspecific gastroenteritis, in whom xylose malabsorption persisted during convalescence, the depression of Na-K ATPase in the acute phase was similar to that in the above patients, but persisted after recovery from the diarrhea. It is suggested that the depression in Na-K ATPase activity may play an etiological role in the onset of diarrhea in these diseases.

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3004 **ZOLLINGER-ELLISON SYNDROME. [CASE REPORT]** *(Rev.)(E.)* Kusakcioglu, O. (Dept. Gastroent., Temple U., Philadelphia, Pa.) and E. W. Heffernon. *Amer. J. Gastroent.* 48(2):110-119, 1967.

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3009 **SYMPOSIUM ON RECENT ADVANCES IN GASTROENTEROLOGY: THE ESOPHAGUS, STOMACH AND DUODENUM. [MEETING OF THE MEXICAN SURG. ACAD., 22 FEB 1966]** *(Sp.)* Peña y de la Peña, E. *Cir. Cir.* 34(4):399-405, 1966.

3010 **PREOPERATIVE INTESTINAL PREPARATION IN RELATION TO THE SUBSEQUENT DEVELOPMENT OF CANCER AT THE SUTURE LINE.** *(E.)* Herter, F. P. (Columbia U. Coll. Phys. & Surg., New York City). *Surg. Gynecol. & Obstet.* 127(1):49-56, 1968.

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3013 **INTESTINAL ANASTOMOSIS BY INVAGINATION: A HISTORICAL REVIEW OF A "NEW" TECHNIC WITH CONTROLLED STUDY OF ITS POTENTIAL.** *(E.)* Linn, B. S. (U. Miami Sch. Med., Fla.), T. M. Reisman, R. W. Yurt and H. C. Polk Jr. *Ann. Surg.* 167(3):393-398, 1968.

3014 **GASTROINTESTINAL LESIONS DEVELOPING DURING ANTICOAGULANT THERAPY.** *(E.)* Pytko, V. F. (Geisinger Med. Ctr., Danville, Pa.). *Bull. Geisinger Med. Ctr.* 20(2):180-181, 1968.

3015 **MALIGNANT CARCINOID OF THE STOMACH AND DISTAL ESOPHAGUS. REVIEW OF THE LITERATURE AND A CASE REPORT.** *(E.)* Brodman, H. R. (Bronx-Lebanon Hosp. Ctr., N. Y.) and B. N. Pai. *Amer. J. Dig. Dis.* 13(7):677-681, 1968.

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3018 **STOMAL CARE.** *(E.)* Rowbotham, J. L. (Boston, Mass.). *New England J. Med.* 279(20): 90-92, 1968.

3019 **ENTEROGENOUS SENSITIZATION TO THE MILD PROTEINS IN CHRONIC COLITIS AND ENTEROCOLITIS.** *(E.)* Ekisenina, N. I. (Moscow, USSR). *Vop. Pitan.* 27(3):52-57, 1968.

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3042 **ELECTROLYTE IMBALANCE IN DEHYDRATION DUE TO ACUTE DIARRHEA.** *(Sp.)* Portillo, J. M. (Dr. Pedro Visca Hosp., Montevideo, Uruguay), R. Maggi, R. Santana-Alfonso, H. García de Cadenazzi, Y. Mascaró, L. Grieco, J. Scheinowitz, R. Minetti de Portos, R. Risso-Comesana and G. García-Moreira. *Arch. Pediat. Uruguay* 39(2):114-121, 1968.

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3056 **DIGESTIVE DISEASE AS A NATIONAL PROBLEM. VII. THE STATE OF OUR KNOWLEDGE OF REPRESENTATIVE DISEASES.** *(E.)* Grossman, M. I. (VA Ctr., Los Angeles, Calif.). *Gastroenterology* 55(3):392-396, 1968.

3057 **INTESTINAL AND LIVER LYMPH AND LYMPHATICS.** *(E.)* Frank, B. W. (U. Colorado Sch. Med., Denver) and F. Kern Jr. *Gastroenterology* 55(3): 408-422, 1968.

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3061 RECENT ADVANCES IN GASTROENTEROLOGY: VOL. 2. TOPICAL PROBLEMS IN DISEASES OF THE ALIMENTARY TRACT (2). *(E.)* [Proceedings of the] 3d World Congress of Gastroenterology, Tokyo, 1966. Basel, Karger Libri AG, 1967. 680 pp.

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3066 DUODENAL INSUFFICIENCY FOLLOWING BILLROTH-II RESECTION: PREVENTION AND TREATMENT WITH A ROUX ANASTOMOSIS. *(Ger.)* Gall, F. (Surg. Clin. & Polyclin., Erlangen U., Nurnberg, Germany). *Bruns Beitr. Klin. Chir.* 216(11):23-28, 1968.

3067 CARCINOID TUMORS OF THE VERMIFORM APPENDIX. *(E.)* Moertel, C. G. (Mayo Clin. & Mayo Found., Rochester, Minn.), M. B. Dockerty and E. S. Judd. *Cancer* 21(2):270-278, 1968.

3068 NESIDIOBLASTOSIS AND THE ZOLLINGER-ELLISON SYNDROME. *(E.)* Brown, R. E. (Med. Coll. Virginia, Richmond) and W. J. S. Still. *Amer. J. Dig. Dis.* 13(7):656-663, 1968.

See also abstract nos.: 2829,2895

3069 ESOPHAGEAL ACHALASIA IN CHILDHOOD. *(Sp.)* Martinez-Mora, J. (Pediat. Clin., Soc. Security Svc., Barcelona, Spain), J. Boix-Ochoa, J. M. Casaca and A. Moragas. *Rev. Esp. Pediat.* 24(139):27-40, 1968.

The nomenclature, incidence, clinical characteristics, diagnosis, treatment and pathological anatomy of infantile megaesophagus are discussed on the basis of a review of the literature (42 refs.) and a report of 3 cases (boys, 5-9 yr old),who showed dramatic improvement after a modified Heller cardiomyotomy. The duration of dysphagia and regurgitation in these children varied from 2.5 months to 3 yr before diagnosis, which was by X-ray (barium swallow). Treatment by bougienage was attempted in all cases (for 2.5 yr in one case) but was unsuccessful. Complete postoperative cure was confirmed by a follow-up of 4-6 yr in two cases (1 month in the 3rd). Histological studies of the surgical specimens in these cases revealed an absence of ganglion cells in the Auerbach's plexi, with hypertrophy of the plexi at the expense of the Schwann cells, but with no signs of degeneration. It is pointed out that childhood esophageal achalasia is very rare, accounting for only about 4% of all cases. Based on the histopathological findings in such cases, the authors propose a new system of classification into pseudoachalasia (functional achalasia secondary to changes at the level of the cardia without alterations in the plexus), neurodegenerative achalasia, and true aganglionic achalasia.

3070 ESOPHAGOMYOTOMY FOR ESOPHAGEAL ACHALASIA: EXPERIMENTAL, CLINICAL, AND MANOMETRIC ASPECTS. *(E.)* Ellis, F. H. Jr. (Mayo Clin., Rochester, Minn.), J. C. Kiser, J. F. Schlegel, R. J. Earlam, J. L. McVey and A. M. Olsen. *Ann. Surg.* 166(4): 640-656, 1967.

X-ray studies of 20 dogs subjected to 3 different types of myotomy on the esophagogastric junction revealed gastric reflux after the "classic" double or "long" Heller myotomy (7 of 14 dogs) but not after the "short" Heller myotomy (6 dogs). Spontaneous esophagitis was seen only after the classic procedure (in 3 of 8 dogs), although esophagitis developed after chronic histamine stimulation in all dogs tested. Manometric studies of esophageal motility 1-8 months postoperatively revealed a comparable decrease in sphincter pressure in all 3 groups. In 4 additional dogs, division of the gastric sling fibers was found to have no effect on the gastroesophageal sphincter pressure; a subsequent "short" Heller operation in 2 of these dogs produced a decrease in sphincter pressure, but no spontaneous reflux. In view of these findings, a "short" Heller myotomy (a 6-12 cm incision extending only a few millimeters onto the stomach wall and preserving the vagi, followed in most cases by lateral dissection of the muscle wall from the mucosa over 50-67% of the circumference) was used in the treatment of 269 patients (142 males and 127 females, 4-80 yr old, average 46.3 yr) with esophageal achalasia over a 17-yr period. Achalasia was "severe" (dilatation of more than 6 cm) in 85, while 135 had a dilatation of 4-6 cm and in 49 it was less than 4 cm. Associated diseases included peptic ulcer in 8, esophageal diverticula in 12, hiatus hernia in 22, gallstones in 7, Hirschsprung's disease in 2, and aspiration pneumonitis in 26. Three patients had had a previous myotomy, and 138 had been treated by repeated bougienage. The principal symptoms were difficulty in swallowing (267 cases), regurgitation (172), weight loss (178), and pain (107), with an average duration of 8.3 yr (range 1 month to 44 yr). There was only one operative death (extreme hyperthermia resulting in cardiac arrest); complications in 10 other cases, including 5 in which the mucosa had apparently been perforated accidentally (perforations were repaired without consequence in 24 others), included abscess, empyema, wound infection, pneumonitis, atelectasis, and one case of combined myocardial infarction and stroke. Among 240 patients operated at least 1 yr before publication, 11 had been lost to follow-up and 2 had died without evaluation of their esophageal function; among the other 227, clinical evaluation after a follow-up of 1-17 yr (average 6 yr) revealed 105 with excellent results, 81 with good results (some dysphagia under stress), 25 with fair results (improvement in the presence of continued dysphagia or regurgitation), and 16 failures. The success could not be correlated with age, sex or duration of illness, although the 16 failures included none of those with only mild dilatation. In 10 of the 16 the poor result was due to gastroesophageal reflux (3 of 10 had a hiatus hernia), while in the other 6 it was due to recurrent or persistent esophageal obstruction due either to incomplete operation or to reapproximation of the incised muscle edges by scar formation. Nearly 75% of 97 patients studied by postoperative X-ray showed improvement in the degree of dilatation, and none of the patients developed cancer. Late postoperative manometric studies (by both open-tube and balloon procedures) of esophageal motility in 20 cases revealed significant decreases in sphincter pressure and maximum esophageal pressure after swallowing, compared to preoperative values, and a shortening of the increased pressure zone between the stomach and esophagus at the expense of the supradiaphragmatic portion. These changes persisted for up to 93 months postoperatively. Esophagomyotomy extending well up on the dilated portion of the esophagus but with only a short extension onto the stomach wall thus weakens but does not destroy the zone of increased pressure at the esophagogastric junction, and can be concluded to be the method of choice for the relief of distal esophageal obstruction in esophageal achalasia.

3071 A FOREIGN BODY IN THE OESOPHAGUS, PRESENTING WITH NEUROLOGICAL SYMPTOMS–AN UNUSUAL COMPLICATION. *(E.)* Jayasena, A. K. M. P. (Dept. Pediat., U. Ceylon, Peradeniya) and H. A. Aponso. *Ceylon Med. J.* 12(4):231-233, 1967.

Autopsy on a 9-month-old infant revealed mediastinitis, pericarditis, pericardial cavity pus, and a right parietal brain abscess containing pus similar to that found in the pericardial sac. Pathology was attributed to an infection induced by a swallowed safety pin which had impacted in the esophageal mucosa. There was an ulcer at the impactin site which led to mediastinitis followed by pericarditis. The cerebral abscess was probably due to a septic embolus, originating in the visceral pericardium and spreading to the left side of the heart from where it travelled to the brain. Chest radiography revealed the open safety pin at level T6-T9 but clinicians and radiologists thought it to be in the infant's shirt. Skull radiography failed to reveal any increased intracranial pressure or calcifications. The brain abscess induced a progressive left side paresis of 2 months duration. Local symptoms and recognizable signs of esophageal foreign bodies were absent in this case.

3072 CARCINOMA OF THE ESOPHAGUS. *(E.)* Iglesias, J. I. (San Juan Vet. Admin. Hosp., Puerto Rico), J. D. Pagan-Pagan and H. M. Nadal. *Bol. Asoc. Med. P. Rico* 60(4):153-164, 1968.

Age distribution, etiology, symptoms, lesion site, treatment, and survival rates were clinically evaluated in 95 patients with primary carcinoma of the esophagus. The highest incidence occurred in the 61-70 years age group. There was little evidence to support the contribution of any one etiological factor in carcinogenesis, even though 66 patients were moderate-to-heavy smokers and 38 had a history of heavy alcohol intake. Dysphagia was the first manifestation of the disease in most patients; anorexia, hoarseness, coughs, weakness, fever, regurgitation, and weight loss were also observed. Diagnosis was made by radiological examination in nearly all patients. All tumors were epidermoid carcinomas and 2 had evidence of pseudosarcomatous stroma. The middle third of the esophagus was the site of the highest lesion incidence. Of the 95 patients, 10 received supportive symptomatic therapy because of the advanced state of the disease; 7 who were later found to be unresectable were also given supportive treatment. Resection was the primary therapeutic measure employed in 43 cases; 29 patients received only radiotherapy and 6 received a combination of radiotherapy and surgery. The resectability rate was 83% and the mortality rate was 33%. The one-year survival rate was 30% for resected cases and 21% for radiotherapy cases. Only 4 patients survived 5 years or more after treatment. This survival rate (4%) confirms the poor prognosis encountered with esophagus carcinoma.

3073 BLEEDING ESOPHAGEAL VARICES: A STUDY INVOLVING 100 CONSECUTIVE CASES. *(E.)* Myers, R. T. (Bowman Gray Sch. Med., Winston-Salem, N. C.). *Amer. Surg.* 33(12):919-922, 1967.

A survey of 100 cases of surgically managed bleeding esophageal varices was made and the cases categorized by intrahepatic or extrahepatic causation and classified by etiology. Hemorrhage was controlled by balloon tamponade and hepatic function was immediately assayed; operative survival correlated with serum albumin level, 3 mg/100 ml being the critical point. Surgery consisted primarily of portal decompression by an end-to-side portacaval shunt; intensive medical therapy was initiated when hepatic function was poor. In 77 patients with bleeding esophageal varices associated with intrahepatic portal bed block, 15 operative deaths occurred; 10 of these were of hepatic failure, 3 of shock, and 2 of hepatorenal failure. There were no immediately postoperative deaths in the extrahepatic block patients; late deaths of unrelated causes occurred in 4 of the 23 patients with extrahepatic block. Hepatic function is usually adequate and operative mortality is insignificant in bleeding esophageal varices of extrahepatic origin. The adult with extrahepatic block is usually managed by hemorrhage control, blood volume replacement with hepatic function evaluation, and portal venous decompression by splenorenal shunt; children under 10 rarely exsanguinate from bleeding varices, tolerate hemorrhage better than adults, and frequently may be deferred through multiple bleeding episodes to an age of 6-10 years when reliable shunting can be done. In a small child with extrahepatic block who bleeds excessively or in an adult or child in whom shunting is precluded by the absence of suitable venous channels, resection of the bleeding area and interposition of a bowel may be done.

3074 INFLUENCE OF GASTROESOPHAGEAL INCOMPETENCE ON REGENERATION OF ESOPHAGEAL MUCOSA. *(E.)* Hennessy, T. P. J. (Dept. Surg., U. Minnesota, Minn.), R. F. Edlich, R. J. Buchin, M. S. Tsung, M. Prevost and O. H. Wangensteen. *Arch. Surg.* 97(1): 105-107, 1968.

The effects of gastroesophageal reflux upon esophageal mucosal defects and sphincter incompetence were investigated in 9 mongrel dogs (9-11 kg) in which a Wendel esophagoplasty and a small hiatus hernia were created. The operative site was examined grossly and microscopically 4 weeks later when the animals were sacrificed. The esophagogastric junction in 5 dogs was markedly reddened; there were no gross lesions in 4 dogs but microscopic examination revealed round cell infiltration and erosion of normal esophageal mucosa. A complete mucosal regeneration defect was noted in only one of the dogs with gross esophageal inflammation and 2 of the 4 dogs without gross lesions; the other 2 dogs without gross lesions showed incomplete regeneration. There was an absence of submucous glands below the regenerating epithelium; lack of columnar mucosa was also noted. The regenerating epithelium consists entirely of squamous epithelial cells. These findings suggest that columnar epithelium in the distal esophagus is not an acquired lesion.

3075 CARCINOMA INVOLVING THE ESOPHAGUS. *(E.)* Jeyasingham, K. (Fac. Med., Colombo, Ceylon), A. M. L. Beligaswatte and F. A. Sandrasegara. *Ceylon Med. J.* 12(4):187-201, 1967.

Esophageal carcinoma, next to buccal and pharyngeal carcinoma, is the most common tumor of the gastrointestinal tract in Ceylon. An analysis of 61 patients, 51 with esophageal carcinoma and 10 with carcinoma of the cardiac and of the stomach invading the lower esophagus was made. Of these, 32 were females, the majority 30-50 yr old, and 29 were males, the majority 50-70 yr old. Dysphagia was the constant symptom in all patients. The author found that if he grouped the patients according to tumor type and site (resectable or nonresectable tumors of the cardia or esophagus), each group showed a characteristic duration of symptoms before consulting a doctor. Those with resectable anaplastic tumors of the cardia had had dysphagia for 1 month, or slightly longer if the tumor was more well-differentiated. Patients with nonresectabl neoplasms of the cardia had had dysphagia longer than 6 months. These patients with resectable tumors of the esophagu had had a 2-3 month history of dysphagia, while the nonresectable patients had a 3-4 months history. Patients invariably presented with nutritional deprivation and electrolyte depletion. The majority weighed 66-90 lbs. Those with tumors of the cardia had low hemoglobin values, while those with tumors of the esophagus had values of 70-80%. Contrast radiography was performed in 50 patients, esophagoscopy in all patients, and bronchoscopy in all those with middle-third esophageal tumors, except in one case. In 2 patients bronchoscopy showe widening of the carina; 1 of these was radically operable and the other nonresectable. Middle-third tumors were categorized into upper and lower middle-third tumors based on location relative to hilar and mediastinal structures. For tumors in the esophagus, resectability depends more on the site of the tumor than on histological differentiation; lower middle-third tumors have a slight advantage over upper middle-third tumors, and those in the lower third have a distinct advantage over all others. For tumors in the cardiac end of the stomach, resectability is directly proportional to the degree of differentiation. Involvement of the paratracheal, subaortic, subcarinal, and hilar nodes was extremely common in esophageal tumors of the upper middle-third. Lymphatic spread from the stomach to nodes in the paracardiac, left gastric, celiac, splenic, subpyloric, and paraesophageal groups was rapid. It is felt that the abdomen should be explored in every case of esophageal tumor; in particular, mobilization of the stomach and pulling it through a dilated hiatus should be discouraged, as it interferes with adequate clearance of celiac group metastasis. Five cm margins on either side of the tumor should be adequate to exclude submucous spread. The operative procedures used were standard for the various situations encountered. The mortality was 37.1% in 35 resections of the thoracic esophagus. Only 2 of 18 females (11.4%) in this group died. If the tumor is resectable, surgical excision is thought to offer the best hope for the patient, regardless of site. If the tumor is not resectable, simpler procedures (such as insertion of a Moosseau-Barbin or Waddington tube) are preferred to extensive surgery (such as a by-pass procedure). For this reason, gastrostomy was performed only on those patients desiring to go home.

3076 CANDIDA ESOPHAGITIS. *(Ger.)* Friedmann, G. (Inst. Radiol., U. Cologne, Germany) and R. Tismer. *Deutsch. Med. Wschr.* 93(23):1141-1144, 1968.

The pathogenesis, radiological diagnosis, prognosis and treatment of esophageal candidiasis are discussed on the basis of a review of the literature (22 refs.) and 4 personal cases (2 men and 2 women, 38-74 yr old). The 2 men developed recurrent acute dysphagia during leukopenia and agranulocytosis resulting from the chemotherapy of myeloid and lymphocytic leukemia (corticosteroids, thioguanine, ampicillin, 6-mercaptopurine, chlorambucil and/or triamcinolone). One woman also developed dysphagia during leukopenia resulting from cytostatic therapy (cyclophosphamide and antibiotics for metastatic mammary carcinoma), while the other developed esophageal candidiasis during treatment with oxacillin and cephalothin for renal failure. Treatment with nystatin (combined in one case with erythromycin and in one with aethoform) was uniformly and rapidly successful, and in the patient with mammary carcinoma prophylactic nystatin was successful in preventing a recurrence of candidiasis despite recurrent leukopenia from renewed cyclophosphamide therapy. It is emphasized that esophageal candidiasis should be suspected in severely ill patients developing acute dysphagia and retrosternal pain during antibiotic, corticosteroid, cytostatic or radiation therapy, even in the absence of obvious oropharyngeal thrush. Radiology is the key to accurate diagnosis, the typical X-ray signs being lack of esophageal motility and loss of extensibility of the esophageal walls, with multiple filling defects and niches and a prolonged deposition of contrast medium in the esophageal mucosa. All these changes are rapidly reversible under antimycotic therapy. Esophagoscopy is not recommended.

3077 IRON ABSORPTION AND BLOOD LOSS IN PATIENTS WITH HIATUS HERNIA. *(E.)* Holt, J. M. (Radcliffe Infirm., Oxford, England), F. G. H. Mayet, G. T. Warner, S. T. Callender and A. J. Gunning. *Brit. Med. J.* 3(5609):22-25, 1968.

In 28 patients (14 men and 14 women, 30-75 yr old) with hiatus hernia, 19 of whom were anemic (hemoglobin = 6.1-12 g%, MCHC = 24-31%), iron absorption and gastrointestinal blood loss were measured after a standard oral dose of 5 mg ferrous iron labeled with ^{59}Fe (5 μC) using an Oxford Whole Body Counter. The mean iron absorption (proportion of radioactivity retained in the body 10-14 days later) was 39% in the anemic patients, being above normal in 17 of 19, and 8% in the 9 other patients (with hemoglobins of 13-16.6 g% and MCHC = 33.37%). Gastrointestinal blood loss over the next 2-3 months was estimated to average 15 ml/day in anemic patients, being significant in 15 of the 19, and 3 ml/day in 7 of the 9 others (not determined in 2 of 9). Occult blood tests with o-tolidine on anemic patients with bleeding, however, were positive in only 27 of 64 cases. In 3 anemic patients, a second measurement of blood loss after surgical repair of the hiatus hernia yielded values of 0, 300, and 510 ml/97-104 days compared to preoperative values of 1800, 740, and 1860 ml/90-99 days, resp. Of the 15 anemic patients with bleeding, 9 had a sliding hernia and 6 a paraesophageal or mixed hernia, but 12 of the 15 hernias were large; only 5 of the 15 had a significant dyspepsia. Gastric secretion (Diagnex test) was impaired in only 3 of the 15, and none of the 10 patients with blood loss examined by esophagoscopy had esophagitis. The symptoms of anemia, in fact, were either the only or the major complaints in 16 of the 19 anemic patients. Severe blood loss was thus associated with large hernias, but not with the degree of dyspepsia. A permanent daily dose of iron by mouth is recommended in anemic patients with hiatus hernia and little or no dyspepsia.

3078 EVALUATION OF 100 ESOPHAGEAL MOTILITY STUDIES AT A UNIVERSITY MEDICAL CENTER. *(E.)* Wilbur, D. L. III. (Sacramento Med. Clin., Calif.), D. S. Demertzis, V. Hjelte and J. V. Carbone. *Calif. Med.* 108(3):159-165, 1968.

In 88 consecutive patients referred during 1964-65 because of swallowing difficulties or idiopathic pain in the chest, fasting esophageal pressures were recorded simultaneously at 3 locations 5 cm apart with a unit consisting of a tiny, water-filled, latex balloon (0.5 cm in diameter and 1 cm long) on a polyethylene catheter and 2 open-tipped polyethylene catheters with lateral holes, connected to a 4-channel Sanborn recorder with amplifiers and transducers. The balloon was used to record the extremely small pressure changes in the gastroesophageal and pharyngoesophageal sphincters. Motility studies were carried out both under resting conditions and while swallowing, with the recording unit at various positions in the esophagus. Although 28 patients were found to have normal esophageal pressures (with a 3.8-cm long gastroesophageal sphincter having a pressure 12.2 cm H_2O above the mean fundic pressure), 17 were found to have achalasia or "cardiospasm" (lack of peristalsis, a gastroesophageal sphincter 3.1 cm long with a pressure of 13.6 cm H_2O, and a characteristically exaggerated response to metacholine which is counteracted by atropine), 22 had diffuse spasm of the esophagus (4.1-cm long sphincter with a pressure of 16.6 cm H_2O), 8 had the closely related syndrome of hypertonic esophagus, 19 had scleroderma of the esophagus (a sphincter 3.4 cm long with a pressure of 10.4 cm H_2O and a pressure tracing resembling that in achalasia, but a negative metacholine test), 13 had hiatus hernia, 1 had a hypertensive sphincter, 3 had a hypotensive sphincter (pressure of 5 cm H_2O or less) and symptoms of reflux esophagitis, and at least 1 had an esophageal tumor. The etiology, diagnostic characteristics and treatment of each of these conditions are briefly outlined.

3079 **TREATMENT OF ESOPHAGEAL CANCER WITH THE CYTOSTATIC AGENTS SP-G AND SP-I.** *(Por.)* Guida Filho, B. (A. C. Camargo Hosp., Sao Paulo, Brazil) and A. P. Mirra. *Rev. Paul. Med.* 72(2):49-54, 1968.

Podophyllotoxin-benzylidene-β-D-glucoside (SP-I) and 2-amino-D-glucopodophyllotoxin (SP-G) were used in the topical treatment of 26 patients with inoperable carcinoma of the esophagus, 10 of whom also received telecobalt therapy (3000 r). All patients were fed by gastrostomy and treated with SP-G or SP-I orally or by nasoesophageal catheter: 9 patients received SP-G by catheter (200, 500 or 1000 mg in 250 ml isotonic solution for 5 days), 11 received SP-I by catheter (1000 mg in 250 ml solution for 5 days), 5 received SP-G p.o. (50 mg every 6 hr for 5-10 days), and one patient with carcinoma of the cardia received SP-G both by catheter (200 mg in 250 ml solution for 2 days) and by mouth (50 mg every 6 hr for 2 days). In 2 patients, initial treatment with SP-G was followed by maintenance treatment with the same drug p.o., but intense retrosternal pain developed which abolished the beneficial effect of the initial treatment. Satisfactory subjective and objective results (decreased dysphagia and decreased obstruction to a barium swallow) were obtained in 15 cases (very good results in 2 of 16 receiving SP-G or SP-I alone and in 2 of 10 also receiving radiation, good results in 3 of 16 and 1 of 10, and fair results in 3 of 16 and 4 of 10). The results were not significantly affected by associated telecobalt therapy, nor by tumor type or localization (1 in the cervical esophagus, 6, 14 and 2 in the upper, middle and lower third, resp., 1 in the abdominal esophagus and 2 in the cardia). Three of the "very good" results were obtained with SP-G by catheter, while SP-I by catheter produced 1 very good result and 4 "good" results; oral SP-G produced only 2 cases of "fair" improvement. One patient improved to such an extent that food could be taken by mouth and the continued use of the gastrostomy was refused. Topical treatment with SP-I or SP-G is highly recommended for the palliative therapy of inoperable esophageal cancer.

3080 **REDUPLICATION OF THE ESOPHAGUS PRESENTING AS MIDESOPHAGEAL WEB AND DIVERTICULUM.** *(E.)* Kelley, M. L. (Hitchcock Clinic, Hanover, New Hampshire), J. Murtagh and W. C. McCarty. *J.A.M.A.* 204(1):171-173, 1968.

3081 **DEMONSTRATION OF THE DISTAL ESOPHAGEAL POUCH IN ESOPHAGEAL ATRESIA WITHOUT FISTULA.** *(E.)* Swischuk, L. E. (U. Oklahoma Med. Ctr., Oklahoma City). *Amer. J. Roentgenol.* 103(2):277-280, 1968.

3082 **CURATIVE TREATMENT OF EPIDERMOID CARCINOMA OF THE ESOPHAGUS.** *(E.)* Millburn, L. (Presbyterian-St. Luke's Hosp., Chicago, Ill.), L. P. Faber and F. R. Hendrickson. *Amer. J. Roentgenol.* 103(2):291-299, 1968.

3083 **ROENTGENOGRAPHIC DEMONSTRATION OF UNUSUAL EXTRA-ESOPHAGEAL VARICES.** *(E.)* Fleming, R. J. (Cornell Med. Ctr., New York City) and W. B. Seaman. *Amer. J. Roentgenol.* 13(2):281-299, 1968.

3084 **END-TO-END ANASTOMOSIS IN ESOPHAGEAL ATRESIA WITHOUT TRACHEAL FISTULA: A CASE REPORT.** *(E.)* Cram, R. W. (U. Saskatchewan, Saskatoon). *Canadian J. Surg.* 11(3):381-384, 1968.

3085 **ESOPHAGEAL FUNCTION FOLLOWING SURGICAL INTERVENTION TO CORRECT ESOPHAGEAL ATRESIA.** *(Ger.)* Ebel, Von K. D. (Munic. Child. Hosp., Köln, Germany) and E. Heiming. *Z. Kinderchir.* 6(1):26-34, 1968.

3086 **DIVERTICULA OF THE THORACIC ESOPHAGUS.** *(Sp.)* Zavaleta, D. E., J. C. Olaciregui, J. M. Romanelli and D. Zavaleta. *Prensa Med. Argent.* 55(11):467-472, 1968.

3087 **ATRESIA OF THE ESOPHAGUS.** *(Rev.)(Sp.)* Ruiz Company, S. (La Paz Pediat. Clin., Madrid, Spain) and J. Cuadros Garcia. *Acta Pediat. Esp.* 26(304):351-406, 1968.

3088 **A MUCOSAL FLAP VALVE MECHANISM TO PREVENT GASTROESOPHAGEAL REFLUX AND ESOPHAGITIS.** *(E.)* Tocornal, J. A. (Dept. Surg., U.C.L.A. Sch. Med., Los Angeles, Calif.), H. D. Snow and E. W. Fonkalsrud. *Surgery* 64(2):519-523, 1968.

3089 **TUBERCULOUS GANGLIO-ESOPHAGEAL FISTULA REVEALED BY HEMATEMESIS.** *(Fr.)* Flabeau, F., F. Leperchey, J. Terquem, P. Seemama and J. Y. Albot. *Mem. Acad. Chir.* 94(14/15):448-451, 1968.

3090 **ESOPHAGEAL ACHALASIA PROBABLY DUE TO GASTRIC CARCINOMA.** *(E.)* Kolodny, M. (New York Hosp., New York City), Z. R. Schrader, W. Rubin, R. Hochman and M. H. Sleisenger. *Ann. Int. Med.* 69(3):569-573, 1968.

3091 **RIGHT COLON AND TERMINAL ILEUM BYPASS OF A CAUSTIC SODA STRICTURE OF THE ESOPHAGUS: PRESENTATION OF A CASE AND ANATOMICAL STUDY.** *(E.)* Barnard, P. M. (Karl Bremer Hosp., Stellenbosch U., Bellville, South Africa). *S. Afr. J. Surg.* 5(4):159-169, 1967.

3092 **SPONTANEOUS RUPTURE OF THE ESOPHAGUS.** *(Sp.)* Trías, R., J. Isern and A. Olivé. *An. Med.* 54(1):3-11, 1968.

3093 **SPONTANEOUS RUPTURE OF THE OESOPHAGUS.** *(E.)* Russell, J. Y. W. (Preston Royal Infirm., England) and N. Macdonald. *Brit. J. Surg.* 55(4):311-314, 1968.

3094 **INDICATIONS FOR ARTIFICIAL ENDO-ESOPHAGEAL PROSTHESES.** *(Ger.)* Honkomp, J. (Surg. Clin., Munster U., Germany). *Bruns Beitr. Klin. Chir.* 216(11):29-42, 1968.

3095 **TREATMENT OF CONGENITAL ESOPHAGEAL ATRESIA.** *(Pol.)* Bialowas-Wysocka, K. (Pediat. Surg. Clin., Warsaw Acad. Med., Poland). *Pol. Tyg. Lek.* 23(7):210-213, 1968.

3096 **TAMPONADE OF ESOPHAGEAL VARICES WITH A TWO BALLOON TUBE.** *(Fr.)* Testart, J. (Lariboisiere Hosp., Paris, France). *Concours Med.* 90(4): 647-653, 1968.

See also abstract nos.: 2887,2904,2907,3019

STOMACH

(Gastric ulcer is placed with peptic ulcer)

3097 **ERYTHROPOIETIC RESPONSE TO THE SIMULTANEOUS ADMINISTRATION OF A THERAPEUTIC DIET AND ANABOLIC STEROIDS IN POST-GASTRECTOMY PATIENTS AND SUBJECTS WITH LOW BODY WEIGHT.** *(Cz.)* Vulterinová, M. (Inst. Study Human Nutr., Prague, Czechoslovakia) and V. Pařiková. *Cesk. Gastroent. Vyz.* 22(2):130-136, 1968.

Administration of a therapeutic diet (providing 2 g/kg protein and 50 kcal/kg) and anabolic steroids (usually Superanabolon, 25 mg i.m. twice weekly; in some Dianabol or Stenolon at 5 mg/day) for 4 weeks to 35 patients (18 with asthenia and 17 with previous gastrectomies) with an average body weight 24% below normal resulted in increased hemoglobin levels in 60% of the cases, particularly in those with prior anemia. A more detailed study on 18 of these patients (8 following gastrectomy and 10 with asthenia) with initial hemoglobin levels below 14.2 g for men and below 13 g for women revealed increases in hemoglobin, red blood count and hematocrit, particularly in the patients with asthenia. There was a positive correlation (r = 0.60) between increased hemoglobin levels and nitrogen retention during the 1st and 2nd week in the asthenia patients but not in those with previous gastrectomies (in the latter, the hemoglobin fell 3 times when the nitrogen retention was positive). During the 2nd week of treatment, serum Fe levels fell significantly, possibly due to increased plasma Fe clearance (demonstrated with ^{59}Fe in 4 patients). The mechanism of these effects on erythropoiesis and Fe clearance remains unknown.

3098 **RELATIONS BETWEEN THE MAIN CONSTITUENTS OF THE DIET, ALCOHOL CONSUMPTION, SMOKING, AND THE INCIDENCE OF STOMACH CANCER IN CZECHOSLOVAKIA.** *(Cz.)* Toman, R. (Fac. Pediat. Med., Charles U., Prague, Czechoslovakia), O. Gregor and F. Průšová. *Cesk. Gastroent. Vyz.* 22(2):122-129, 1968.

An epidemiological study of stomach cancer, based on mortality rates for men from various regions of Czechoslovakia, revealed no statistically significant correlation between the incidence of stomach cancer and either diet or smoking. There was also no correlation between stomach cancer and total alcohol consumption, but when hard liquor alone was considered, a significant correlation was obtained for the various sections of Bohemia (0.82), and an insignificant correlation (0.33) for all of the various regions of Czechoslovakia. Mortality from stomach cancer in 1963 ranged from 40.86 in Prague to 64.13 in Northern Moravia, and averaged 51.32 for the country as a whole. The average diet in 1962 provided 3134 calories/day (from 2790 in Prague to 3283 in Southern Bohemia, where the cancer mortality was 54.31), 5.8% from vegetable protein (range 5.0-6.3%), 5.4% from animal protein (4.6-6.7%), 30.7% from fat (26.9-38.3%) and 58.1% from carbohydrate (50.0-62.5%). The Prague diet tended to be high in animal protein and fat, and low in carbohydrate, but was not significantly different from that in Northern Moravia. According to statistics for 1966, 41% of the male population smoked in Czechoslovakia as a whole, ranging from 31.0-37.0% in Southern Moravia to 41.3-48.7% in Eastern Slovakia, where the cancer mortality was 51.20; the figures for Prague (38.6-45.4%) and Northern Moravia (36.8-43.2%) were not significantly different. The total alcohol consumption (beer, wine and hard liquor) in 1963 ranged from 2016 g in Southern Moravia and 2124 g in Prague to 3637 g in Western Bohemia (2493 g in Northern Moravia). Hard liquor consumption, however, ranged from 0.20 liters in Prague to 1.52 liters in Eastern Slovakia (1.06 liters in Northern Moravia) and showed a correlation coefficient of 0.33 with mortality from stomach cancer. Considering only Bohemia, the Northern, Southern, Eastern, Western and Central portions had a hard liquor consumption of 0.54, 0.55, 0.63, 0.60 and 0.62 liters, resp., and stomach cancer mortality rates of 52.75, 54.31, 47.58, 52.75 and 55.34.

3099 ***IN VIVO* AUTORADIOGRAPHY IN THE DIAGNOSIS OF STOMACH CANCER.** *(Rus.)* Sokolov, Iu. N. (Cent. Inst. Postgrad. Med., Moscow, USSR), I. P. Berezhnov and T. A. Tret'iakova. *Vestn. Rentgen. Radiol.* (1):3-13, 1968.

Balloon autoradiography of the stomach, 48-96 hr after the i.v. administration of $Na_2H^{32}PO_4$ (1.6 μC/kg in 1 ml saline), was carried out 93 times in 33 patients with various diseases of the stomach, 18 of whom came to surgery and all of whom were also examined by X-ray. A half hour after the s.c. injection of 1 ml 0.1% atropine sulfate and 1 ml 2% Promedol, to suppress salivation and gag reflexes, the patient swallowed a photoballoon, attached to a thin rubber duodenal catheter, which was then inflated to a volume of 500-1800 ml in the stomach. The exposure time was 45-60 min, after which the balloon was deflated and withdrawn and the film was developed in the same way as conventional X-rays. Criteria for the recognition of various gastric diseases by balloon autoradiography are outlined and illustrated. Among 21 cases of verified stomach cancer, 20 were diagnosed by balloon autoradiography and only 19 by X-ray; autoradiography was also successful in recognizing the malignant nature of 2 gastric ulcers undergoing malignant transformation, which were missed by X-ray. However, false positive diagnoses of cancer were produced by autoradiography in 1 of 3 cases of gastric polyps, 2 of 5 cases of benign ulcer, and 1 of 2 with hypertrophy of the mucosa, while conventional X-ray yielded a false positive diagnosis in only 1 ulcer patient. It is concluded that balloon autoradiography is particularly useful in the diagnosis of malignant gastric ulcers and the detection of recurrent cancer in the gastric stump, but that the technique should be used only in combination with conventional X-ray.

3100 **RELATIONSHIP BETWEEN CHANGES IN DIGIT BLOOD FLOW AND THE DUMPING SYNDROME.** *(E.)* Strandness, D. E. (U. Washington Sch. Med., Seattle) and J. W. Bell. *Ann. Surg.* 166(1):773-777, 1967.

Increased heart beat and blood pressure, electrocardiographic abnormalities, decreased cardiac output, and decreased serum potassium and plasma volume have been observed as coinciding with or following the development of dumping syndrome symptoms. A confirmation of these findings was attempted in a study of 93 gastric surgery patients; 35 patients were studied before and 3 months after surgery and the remaining 58 returned to the hospital months and years after surgery with complaints referable to the gastrointestinal tract which may or may not include dumping syndrome. Digit volume pulse amplitude of the finger was monitored with a mercury strain gauge plethysmograph 5 minutes before and for 30 minutes after ingestion of 150 ml of 50% dextrose; all patients were sitting with the arm resting slightly below heart level. Thirty-five patients given glucose prior to surgery exhibited no symptoms; increased digit pulse amplitude was noted during the 30-minute observation period. No symptoms were observed in 40 postoperative patients; there was no distinctive pulse pattern. Vasomotor symptoms alone were observed in 16 patients; there were wide variations in pulse amplitude responses. This study fails to support the concept that early dumping syndrome is either preceded or accompanied by peripheral vasodilation.

3101 **MANAGEMENT OF GASTRIC PERSIMMON BEZOARS.** *(E.)* Jaffe, B. M. (Washington U. Sch. Med., St. Louis, Missouri) and W. F. Sasser. *Amer. J. Surg.* 114:962-965, 1967.

Persimmon bezoars of the stomach were diagnosed in 13 patients with symptoms of epigastric pain, vomiting, hematemesis and nausea. Gastrointestinal bleeding occurred in 7 of the patients; bleeding was massive in 4 and occult in 3. Gastric ulcers were found during surgery in 7 patients. Death, attributable to postoperative septicemia and renal failure, occurred in only 1 patient. The aims of surgery are to relieve the symptoms, prevent marked inanition, and reduce the incidence of complications. Gastrotomy alone is insufficient treatment for patients with bleeding ulcers. The ideal surgical treatment for gastric persimmon bezoar complicated by ulcers is gastrotomy with bezoar removal and wedge resection of the ulcer. This procedure allows for biopsy, hemostasis and prevention of postoperative perforation without incurring the increased mortality, postoperative morbidity and nutritional deficiencies associated with gastric resection.

3102 **MANAGEMENT OF HEMORRHAGIC GASTRITIS: ANALYSIS OF 34 CASES.** *(E.)* Nagel, C. B. (California Coll. Med., Los Angeles), R. B. Doering, R. A. Steedman and J. E. Connolly. *Amer. Surg.* 33(10):815-819, 1967.

Among 34 patients treated for diffuse hemorrhagic gastritis in a 10-yr period, 12 were mild-moderate bleeders who responded rapidly to conservative therapy (blood replacement, iced-saline gastric lavage, and general support) and required an average of only 2.25 units of blood, while 22 were severe-massive bleeders who required an average of 12.75 units of blood and had to be treated surgically (vagotomy and pyloroplasty in 14, vagotomy and partial gastrectomy in 6, partial gastrectomy or pyloroplasty alone in 2). Diagnosis in all cases was by gastroscopy and/or laparotomy, and there were no significant differences between the two groups in age range, clinical symptoms or associated abnormalities (alcoholism, chronic gastritis, cirrhosis, hiatus hernia, peptic ulcers). There were no deaths or recurrences in the medically treated group. Bleeding stopped immediately after vagotomy in all cases, although it recurred in the early postoperative period in 2; there were 6 deaths (due to hepatic failure, rebleeding, renal or cardiac failure, pneumonia, or pulmonary embolism), including 2 after vagotomy and pyloroplasty, 2 after vagotomy and resection, and 2 who were not vagotomized. Ten survivors who were followed for from 1 month to 9 yr after vagotomy and pyloroplasty showed no recurrences. The importance of distinguishing rapidly between moderate and massive bleeders is emphasized, and vagotomy and pyloroplasty are recommended as the treatment of choice if the bleeding has no responded to conservative management within 48 hr.

3103 **INTRAMURAL GASTRIC EMPHYSEMA.** *(E.)* Seaman, W. B. (New York Hosp.-Cornell Med. Ctr., New York City) and R. J. Fleming. *Amer. J. Roentgen.* 101(2):431-436, 1967.

Intramural stomach gas was revealed radiologically in 3 patients and during autopsy in 1 case; the phenomenon is not in itself an entity, but a sign of underlying infection, mucosal ischemia, increasing intraluminal pressure, gastroscopic inflation, or severe vomiting. The gas is of intraluminal origin (obstruction or inflation) or extraluminal origin (gas-forming bacteria). The clinical significance is dependent upon the nature of the underlying abnormality.

3104 **THE CLINICAL AND METABOLIC CONSEQUENCES OF TOTAL GASTRECTOMY. II. ANEMIA, METABOLISM OF IRON, VITAMIN B_{12} AND FOLIC ACID.** *(E.)* Adams, J. F. (Southern Gen. Hosp., Glasgow, Scotland). *Scand. J. Gastroent.* 3(2):145-151, 1968.

Twenty postgastrectomy patients were studied for the incidence of anemia and iron, vitamin B_{12} and folate deficiency. Iron deficiency (hemoglobin 11.0 g/100 ml) was found in at least one in ten patients and sideropenia (serum iron 50 μg/100 ml) without anemia in four others. Multiple factors appearing responsible are operative blood loss, tumor growth, insufficient iron intake, anastomotic bleeding, and iron malabsorption. The mean time of presentation of megaloblastic anemia in six patients was 50 months. Four patients responded to large doses of vitamin B_{12}, and two to both vitamin B_{12} and folic acid. The pattern of serum vitamin B_{12} levels in 12 patients was a rapid fall to an equivocal range followed by a long period in this range. Two patients showed a significant rise after the initial rapid fall, presumably from tissue destruction and liberation of vitamin B_{12} due to gross intra-abdominal carcinomatosis found at necropsy. Lower values of vitamin B_{12} absorption in two post-total gastrectomy patients when compared with six patients with pernicious anemia given a standard dose of intrinsic factor, suggests that the absorption defects in these two groups are not entirely comparable. Folate status in 11 patients revealed a deficiency in one case, probably of dietary origin.

3105 **TRAUMATIC RUPTURE OF AN EXOGASTRIC LEIOMYOSARCOMA.** *(E.)* Richter, R. M. (The Jewish Hosp. Med. Ctr., Brooklyn, New York City). *Amer J Gastroent* 50(2):144-147, 1968.

The previously unreported entity of traumatic rupture of an exogastric leiomyosarcoma is reported. One day after blunt abdominal trauma from a fall, a 74-yr-old woman developed unremitting abdominal pain, fever, nausea, and left shoulder pain. She appeared acutely ill. The abdomen was soft, but generally tender without rebound tenderness. Bowel sounds were diminished. Abdominal paracentesis yielded no fluid or blood. Abdominal X-rays revealed a nonspecific ileus pattern. Repeat abdominal X-ray examination revealed air beneath the right hemidiaphragm. On the 2nd hospital day laparotomy revealed free blood, gastric contents, and necrotic tumor fragments in the peritoneal cavity. A cavitated exogastric tumor 14 cm in diameter was found arising from the greater curvature opposite the spleen. Adhesions between tumor and spleen had been avulsed with laceration of the spleen and rupture of the tumor. Examination of the tumor revealed communication of the central excavation of the tumor with the gastric lumen. The patient died 8 months after discharge with widespread intraabdominal metastatic disease. The tumor probably would have progressed to spontaneous rupture had not trauma intervened.

3106 **PREVALENCE OF GASTRITIS IN A RURAL POPULATION. BIOPTIC STUDY OF SUBJECTS SELECTED AT RANDOM.** *(E.)* Siurala, M. (U. Helsinki, Finland), M. Isokoski, K. Varis and M. Kekki. *Scand. J. Gastroent.* 3(2):211-213, 1968.

Gastric biopsies were performed in 142 randomly selected subjects, age 16-65 yr, representative of the whole population with regard to sex, age, and occupation. Abdominal complaints were present in 68% of the biopsy subjects, compared to 39% of 56 subjects not biopsied. No difference in prevalence of gastritis was found between those with and without the complaints. Prevalence of gastritis was 53%; 25% were superficial, and 28% atrophic. Severe atrophic gastritis was present in 4%. Patchy distribution of superficial and atrophic gastritis was found in 11%. No significant sex distinction was noted between subjects with normal and gastritic mucosa over 50 yr of age, the difference was nearly significant ($p < 0.05$). Women had atrophic gastritis more frequently than men, but the sex difference was not significant. This sex difference also became nearly significant ($p < 0.05$) over 50 yr of age. The prevalence rate of gastritis increased significantly with age; the rate of increase was 1.4 yearly percent of the corresponding age group. This was due mainly to an increase of atrophic gastritis (1.25 ± 0.19 yearly percent), with the prevalence of superficial gastritis remaining nearly constant. Age-specific prevalence rates of gastritis do not have an exponential distribution, suggesting the presence of inherent age factors predisposing to the high prevalence of gastritis in older people. Transition time from superficial to atrophic gastritis was computed at 19 years. Previous follow-up examination studies showed a rate of 17 years.

3107 **CANCER OF THE STUMP OF THE STOMACH FOLLOWING RESECTION FOR ULCER.** *(Fr.)* Waridel, D. (Lausanne, Switzerland). *Med. Hyg.* (806): 1453-1454, 1967.

A clinical study was made of stomach stump cancer in 12 men and 1 woman between the ages of 51 and 83 years. These patients had been previously operated on for duodenal or gastric ulcers (7 had undergone total gastrectomy or resection). Although it is logical to suppose that stomach resection favors cancer, the author does not think that resection makes one any more susceptible to stomach cancer than any individual in the general population. The alterations of the stomach stump mucosa following the trauma of stomach resection do resemble those of the mucosa of a stomach cancer individual. The metaplasia noted following stomach resection is not specific for a postoperative condition, for these same zones of metaplasia can be observed in the mucosa of nonoperated stomachs. The incidence of Biermer's anemia is not higher among individuals having had stomach surgery than among the normal population. Certainly hereditary factors must play some part in the development of cancer. Familial stomach cancers were found in 6 of the individuals studied here.

3108 **ASPIRIN INJURY TO THE GASTRIC MUCOSA: GASTROCAMERA OBSERVATIONS OF THE EFFECTS OF pH.** *(E.)* Thorsen, W. B. (U. Wisconsin Med. Sch., Madison), D. Western, Y. Tanaka and J. Morrissey. *Arch. Intern. Med.* 121(6):499-506, 1968.

The frequency of gross mucosal damage and hemorrhage after aspirin ingestion with 100 ml of 0.1 N hydrochloric acid (HCl) or 1 N sodium bicarbonate ($NaHCO_3$) was evaluated by aspirate pH measurements and gastrocamera studies in 32 healthy subjects who abstained from alcohol and aspirin for 1 week prior to the experiment, and who had no previous history of gastrointestinal disorders, allergies, or bleeding diatheses. Each subject served as his own control, receiving lactose tablets in place of aspirin; this phase of the experiment was done before aspirin ingestion studies. Gastric aspirate pH ranges were 8.2-8.9 and 1.2-2.1 for $NaHCO_3$ and HCl, respectively. No hemorrhagic lesions were evident in gastric mucosa after $NaHCO_3$ with aspirin or lactose; after HCl ingestion with lactose, only 4 out of 26 subjects showed any reaction; 10 of 20 subjects given aspirin with HCl exhibited hemorrhage, petechiae, or ecchymoses, reliable indices of mucosal injuries. Six of these 10 subjects experienced gross gastrointestinal bleeding; 3 of 4 subjects reacting to lactose HCl also reacted to aspirin and HCl. No correlation was found between drug contact and areas of reaction; the reactions were diffuse throughout the stomach. Gastric bleeding was determined by Hemastix analysis; 12 of the 26 patients given lactose-HCL had some blood in stomach contents, while bleeding occurred only rarely in the lactose-$NaHCO_3$ group. The Hemastix reactions correlated well with visual observations. No subject exhibited aspirin intolerance before or during the experiment. Three subjects who were frequent aspirin users, did not react to the drug.

3109 **ANTIBODY TO GASTRIC INTRINSIC FACTOR IN BLOOD DONORS AND HOSPITAL PATIENTS.** *(E.)* Ungar, B. (Royal Melbourne Hosp., Australia). *Aust. Ann. Med.* 17(2):107-109, 1968.

The presence of gastric intrinsic factor antibody was investigated in 500 blood donors and 1100 hospital patients without conditions in which intrinsic factor antibody are usually detected. Intrinsic factor was determined by the coated charcoal technique and was considered present when the titre exceeded 5 mg/ml of serum; gastric juice intrinsic factor, parietal cell antibody, serum vitamin B_{12}, and vitamin B_{12} absorption were also measured. Circulating antibody to intrinsic factor was detected in only 5 hospital patients and none of the blood donors; these patients also had detectable gastric parietal cell antibody. One patient with obstructive esophageal carcinoma died shortly after esophagectomy had been performed. Only 1 patient with antibodies was anemic; hypochromic anemia, neutrophil hypersegmentation, and bone marrow normoblastic erythropoiesis, iron deficiency, and occasional giant metamyelocytes were observed. Two patients had serum vitamin B_{12} levels suggestive of pernicious anemia. The 4 patients investigated had achlorhydria and impaired B_{12} absorption. This study suggests an overall incidence of 1% of hospital patients over 50 yr of age with latent pernicious anemia.

3110 **DISACCHARIDASES, LEUCINE AMINOPEPTIDASE, AND GLUCOSE UPTAKE IN INTESTINALIZED GASTRIC MUCOSA AND IN GASTRIC CARCINOMA.** *(E.)* Klein, N. C. (New York Hosp., N. Y.), M. H. Sleisenger and E. Weser. *Gastroenterology* 55(1):61-67, 1968.

Biochemical and physiological studies were carried out on gastric and jejunal biopsy specimens from 5 patients (3 men and 2 women, 54-82 yr) with histologically confirmed intestinalization of the gastric antrum (2 patients with cancer and 1 each with gastric ulcer, pernicious anemia and tropical sprue) and 19 control patients (11 men and 8 women, 17-82 yr) with histologically normal antrums (4 patients with stomach cancer, 5 with gastric ulcer and 10 with miscellaneous conditions). No significant lactase activity was found in any of the antral or fundic specimens (up to 0.4 U/g in controls and 0.5 U/g in intestinalized antrums, compared to 4.0 U/g in normal jejunum). Sucrase activity averaged 0.2 U/g in normal antrums and fundi, 2.6 U/g (1.0-4.6) in intestinalized antrums, and 8.0 U/g in normal jejunum. Maltase activity averaged 0.3-0.4 U/g in normal antrums or fundi, 5.6 U/g (1.6-8.7) in intestinalized antrums, and 17.6 U/g in normal jejunum. Leucine aminopeptidase activity averaged 8.8 U/mg in normal antrums, 3.6 U/mg in normal fundi, 70.6 U/mg (33.8-101.2) in intestinalized antrums, and 96.4 U/mg in normal jejunum. Five of the 6 gastric carcinomas studied revealed no significant enzyme activity, but 1 (a scirrhous tumor overlaid with intestinalized gastric mucosa) had lactase, sucrase, maltase and leucine aminopeptidase activities of 0.6, 1.6, 10.5 and 72.0, resp. No significant activity was found in metastatic intra-abdominal lymph nodes. Uptake of glucose-^{14}C was also higher in intestinalized antrums (being comparable to that in normal jejunum) than in normal antrums or fundi. These findings support the concept that the intestinal type of epithelium in the stomach, the origin of which remains unknown, preserves its biochemical and functional integrity to a significant degree.

3111 **PARIETAL-CELL ANTIBODIES IN PATIENTS UNDERGOING GASTRIC SURGERY.** *(E.)* Ashurst, P. M. (Frenchay Hosp., Bristol, England). *Brit. Med. J.* 2(5606):647-649, 1968.

Preoperative and serial postoperative serum specimens from 51 patients undergoing gastric surgery were analyzed for the presence of parietal cell antibodies by the immunofluorescent "sandwich" technique. In no case were circulating antibodies detected postoperatively that had not been found preoperatively. The incidence of parietal cell antibodies was below the normal range for the age and sex of the patients. Two of 22 patients with gastric cancer showed circulating antibodies. The failure to find circulating parietal cell antibodies in patients having undergone gastric surgery tends to deny the hypothesis that autoimmunization is the result of damage to the gastric mucosa.

3112 **DISACCHARIDASES OF THE GASTRIC MUCOSA IN CHRONIC ATROPHIC GASTRITIS WITH INTESTINAL METAPLASIA.** *(E.)* Classen, M. (Dept. Med., U. Erlangen-Nürnberg, Erlangen, Germany), G. Hinuber and L. Demling. *Digestion* 1(1):52-58, 1968.

The disaccharidase content of gastric mucosal cells from 11 patients with histologically normal gastric mucosa, 10 with superficial gastritis, 7 with atrophic gastritis and 10 with additional intestinal metaplasia were analyzed and compared with the disaccharidase content of jejunal mucosa obtained from 13 normal patients. Specimens from patients with normal gastric mucosa and those with superficial gastritis showed only small amounts of maltase activity with no statistical difference between the 2 groups. In atrophic gastritis the maltase activity was significantly higher than in normal mucosa ($p = 0.001$). Other disaccharidases were not present. Of the 10 cases of intestinalized gastric mucosa, all contained maltase, 9 contained sucrase, 5 contained lactase, and 3 contained trehalase; the maltase activity was significantly higher ($p < 0.001$) than in the other groups. Compared with normal jejunal mucosa, the disaccharidase activities in intestinal metaplasia of the stomach averaged 5.4% for maltase, 7.9% for sucrase, 2.75% for lactase, and 2.15% for trehalase. These findings support the assumption that the stomach in mucosal atrophy and intestinalization of mucosal cells exchanges its secretory function for absorptive capacities.

3113 **SURVEY OF HAEMORRHAGIC EROSIVE GASTRITIS.** *(E.)* Thompson, C. E. R. (Frenchay Hosp., Bristol, England), P. M. Ashurst and T. J. Butler. *Brit. Med. J.* 3(56):283-285, 1968.

The etiology of erosive gastritis was investigated by immunofluorescent studies of gastric parietal cell antibodies in 40 patients; blood group and gastric acidity studies were also carried out. No antibodies to gastric parietal cells, gastric mucous cells or calf thyroid were found. Blood group studies showed that 57.5% of the patients were in blood group A, and 37.5% were in group O. Achlorhydria was found in all patients tested for gastric acidity. The increased incidence of blood group A individuals in the hemorrhagic erosive gastritis population over group A individuals in the general population was statistically significant. There was a 60% (10% in all patients) mortality rate in patients undergoing surgery; all deaths occurred in patients taking aspirin, and 3 out of 4 were in blood group A. This fact suggests that the combination of aspirin and blood group A factor make bleeding more severe and of longer duration. Twenty-five cases were thought to be drug-induced; aspirin, alcohol, butazolidin, and steroids were implicated. The findings suggest that hemorrhagic erosive gastritis is not an autoimmune phenomenon.

3114 ENDOSCOPIC FINDINGS IN CHRONIC GASTRITIS DUE TO TUBERCULOSTATIC DRUGS. *(Jap.)* Yoshimoto, T. (Izume Natl. Sanat., Ehime, Japan). *Iryo* 22(3):340-344, 1968.

The results of clinical examination, X-ray and endoscopy using the Gastrocamera were compared in 35 tubercular patients (26 men and 9 women, 20-60+ yr old but most between 40 and 60) who complained of persistent gastric symptoms (heartburn in 17 cases) during prolonged treatment (from 7 months to 25 yr) with various tuberculostatic drugs (PAS in 11, PZA in 4, sulfanilamide in 12 and ethionamide [1314-TH] in 8). Gastritis was confirmed endoscopically in 30 of these patients. The type of gastritis (atrophic in 51%, hypertrophic in 15%) was found to depend primarily on the drug used and secondarily on the type of tuberculosis. Although patients treated with PAS had severe symptoms, most had only slight gastritis and 30% were endoscopically normal. The majority of those treated with sulfa drugs had slight atrophic gastritis, while most treated with 1314-TH had moderate-advanced superficial gastritis.

3115 BEZOARS – A COMPLICATION OF THE POSTGASTRECTOMY STATE. *(E.)* Cain, G. D. (U. Texas Med. Branch, Galveston), P. Moore Jr. and M. Patterson. *Amer. J. Dig. Dis.* 13(9):801-809, 1968.

Two cases of postgastrectomy bezoar formation are presented. The 1st patient developed symptoms of obstruction 4 weeks after an antral resection with vagotomy and a gastroduodenostomy. The 2nd patient developed symptoms of obstruction 2 years after a partial gastrectomy with a Hofmeister gastrojejunostomy. Both patients had subsequent surgical removal of the bezoars and uneventful recoveries. Roughage, delayed emptying, narrow stoma, decreased gastric secretion, and improper mastication play a role in bezoar formation. Prevention is the preferred measure, but once the bezoar has formed, a short trial of papain and surgery are indicated.

3116 DISTURBANCES IN GLUCOSE TOLERANCE TEST IN PATIENTS WITH GASTRIC CARCINOMA. *(E.)* Himmel, A. (Military Acad. Med., Lócž, Poland), B. Romanowska-Górecka and H. Trief. *Scand. J. Gastroent.* 3(2):202-206, 1968.

The study consists of 10 males with gastric carcinoma (ages 43 to 66) and a control group of 10 healthy males. Factors likely to disturb the glucose tolerance test were eliminated. All subjects had been on a diet containing at least 300 g of carbohydrate daily for at least one week. The rapid i.v. glucose tolerance test was performed after a 14 hr fast. Blood sugar levels were determined by the Hagedorn-Jensen method, and glucose disappearance from the blood was determined by the Amatuzio method. The values of the coefficient K (rate of disappearance of glucose from the blood) averaged 2.41 (range 1.04-3.81) in the gastric carcinoma group and 4.60 (range 3.97-5.07) in controls. Fasting blood sugar levels were similar in the 2 groups. The values of K were found to be associated neither with the degree nor the extent of the neoplastic infiltration. An indirect action of neoplastic tissue on homeostatic mechanisms of normal blood sugar concentration is suggested.

3117 CHOLESTASIS AFTER GASTRECTOMY. *(Fr.)* Lagache, G. (Gen. Surg. Clin. Adults, Munic. Hosp., Lille, France) and F. Leplat. *Acta Gastroent. Belg.* 31(2):134-148, 1968.

Among 18 patients who developed cholelithiasis following partial gastrectomy (15 for ulcer and 3 for cancer), there were 16 with stones in the gallbladder, one with acute cholecystitis following a postoperative recurrence of peptic ulcer, and one with an external biliary fistula due to lithiasis. The 15 ulcer patients (13 men and 2 women) included 2 treated by Pean hemigastrectomy and 13 treated by Finsterer hemigastrectomy, the interval between operation and cholelithiasis being from 1 to >10 yr. Radiological follow-up of a larger series revealed a normal gallbladder in only 3 of 9 ulcer patients treated by Pean hemigastrectomy plus Billroth I reconstruction, 21 of 36 ulcer patients receiving Finsterer hemigastrectomy and Billroth II reconstruction, 9 of 17 cancer patients treated by Finsterer hemigastrectomy, 1 of 6 cancer patients subjected to total gastrectomy, and 0 of 5 cancer patients treated by the method of Sweet. Biliary abnormalities in the remaining patients fell into two main types: isolated vesicular dystonia due to disruption of the synergism between the gallbladder and the sphincter of Oddi (resulting in either hyper- or hypokinesia), and dystonia of the common bile duct with intracholedochal hypertension. Some of the factors which may play a role in the development of such complications are: aggravation of preexisting biliary dystonia, local inflammatory reactions, duodenal dyskinesia, duodenal exclusion as in the Finsterer technique, and the effects of vagotomy. With regard to the latter, a follow-up of 113 patients given vagotomy for peptic ulcer revealed 12 with major abnormalities in the biliary tract (mostly cholelithiasis and bladder atonia) and 24 others with an increased bladder volume with or without disorders in evacuation. Cases with some type of biliary dysfunction included 10 of 25 treated by vagotomy + pyloroplasty, 5 of 19 given vagotomy + gastroenterostomy, 1 of 6 treated by vagotomy + Pean hemigastrectomy and Billroth I reconstruction, 22 of 42 treated by vagotomy + Finsterer hemigastrectomy and Billroth II reconstruction, and 6 of 10 given vagotomy alone.

3118 STUDIES ON THE CONSTITUTION OF MUSCLE OF HUMAN STOMACH. PART 1: THE CONSTITUTION OF MUSCLE LAYERS OF SURGICALLY RESECTED STOMACH SPECIMENS. PART 2: THE CONSTITUTION OF MUSCLE LAYERS OF STOMACH AND ITS RELATION TO THE LOCATION OF GASTRIC ULCERS. *(E.)* Yoshida, K. (Jikei U. Sch. Med., Japan). *Jikei Med. J.* 13(1):80-81, 1966.

3119 STUDY OF THE GASTRIC CHANGES PRODUCED BY PORTACAVAL ANASTOMOSIS IN THE RAT. *(Fr.)* Bel, A. (Red Cross Hosp., Lyon, France), R. Levrat, J. Nesmoz and M. Girard. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):87, 1968.

3120 EFFECTS OF PRENATAL MATERNAL HANDLING AND DIFFERENTIAL HOUSING ON OFFSPRING EMOTIONALITY, PLASMA CORTICOSTERONE LEVELS, AND SUSCEPTIBILITY TO GASTRIC EROSIONS. *(E.)* Ader, R. (Dept. Psych., U. Rochester Sch. Med. & Dent., N. Y.) and S. M. Plaut. *Psychosom. Med.* 30(3):277-286, 1968.

3121 CARCINOID TUMOR OF THE STOMACH RESEMBLING CARCINOMA. *(E.)* Okeon, M. M. (San Francisco, Calif.) and W. P. Bieber. *Amer. J. Roentgen.* 103(2):314-316, 1968.

3122 BENZIDAMINE AND THE GASTRIC MUCOSA. *(It.)* Ricci-Bitti, M. L. (Inst. Spec. Med. Path., U. Bologna, Italy). *Clin. Europ.* 7(1):111-115, 1968.

3123 GASTRIC RETICULOSARCOMA IN HEMATOLOGICAL PRACTICE. *(Rus.)* Kazantsev, L. I. *Med. Zhur. Uzbek.* (4):73-74, 1968.

3124 CASE OF A GIANT TRICHOBEZOAR OF THE STOMACH. *(Rus.)* Iskandzhanov, I. I. (Tashkent Med. Inst.) and Ie. N. Khegay. *Med. Zhur. Uzbek.* (4):76, 1968.

3125 SOME ASPECTS OF CHRONIC GASTRITIS. *(E.)* Schade, R. (Newcastle Gen. Hosp., Newcastle upon Tyne). *T. Gastroent.* 11(2):164-170, 1968.

3126 ROENTGEN DEMONSTRATION OF PROLAPSE OF BENIGN POLYPOID GASTRIC TUMORS INTO THE DUODENUM, INCLUDING A DUMBBELL-SHAPED LEIOMYOMA. *(E.)* Short, W. F. (Hahnemann Med. Coll. & Hosp., Philadelphia, Pa.) and B. R. Young. *Amer. J. Roentgenol.* 103(2):317-320, 1968.

3127 MENETRIER'S DISEASE OF THE STOMACH IN CHILDREN. *(E.)* Burns, B. (Emory U. Sch. Med., Atlanta, Ga.) and B. B. Gay Jr. *Amer. J. Roentgenol.* 103(2):300-306, 1968.

3128 ALTERATIONS DURING THE REPAIR OF INJURY INDUCED BY GASTRIC FREEZING. *(E.)* Klavins, J. V. (Duke U. Med. Ctr., Durham, N. C.), W. W. Shingleton and R. L. Fuson. *Cryobiology* 4(6):309-316, 1968.

3129 NEONATAL GASTRIC PERFORATION. *(E.)* Wilson, E. S. Jr. (Letterman Gen. Hosp., San Francisco, Calif.). *Amer. J. Roentgenol.* 103(2):307-309, 1968.

3130 GASTRIC LEIOMYOMA. [CASE REPORT AND REVIEW] *(Sp.)* Diez, J. A. (Med. Surg. Inst., Hacienda Polyclin., Buenos Aires, Argentina) and E. Patrizi. *Prensa Med. Argent.* 55(6):287-291, 1968.

3131 THE SEX RATIO IN GASTRIC CANCER AND HYPOTHETICAL CONSIDERATIONS RELATIVE TO AETIOLOGY. *(E.)* Griffith, G. W. (Min. Hlth., Alexander Fleming House, London, England). *Brit. J. Cance* 22(2):163-172, 1968.

3132 TRANSECTION OF THE STOMACH DUE TO BLUNT ABDOMINAL TRAUMA. REVIEW OF PREVIOUS REPORTS AND PRESENTATION OF TWO NEW CASES. *(E.)* Rooney, J. A. (Loretta Hosp., Chicago, Ill.) and I. G. Pesek. *J. Trauma* 8(4):487-492, 1968.

3133 MICROANGIOPATHIC HEMOLYTIC ANEMIA AND DEFIBRINATION SYNDROME IN METASTATIC CARCINOMA OF THE STOMACH. *(E.)* Seligsohn, U. (Govt. Hosp., Tel-Hashomer, Israel), H. Weber, C. Yoran, A. Horowitz and B. Ramot. *Israel J. Med. Sci.* 4(1):69-75, 1968.

3134 GASTRIC LIPOMA MANIFESTED BY A DIGESTIVE TRACT HEMORRHAGE. [CASE REPORT] *(Fr.)* Dry, J. (St. Antoine Hosp., Paris, France), Conte-Marti, E. Maison and P. Mornet. *Sem. Hop. Paris* 44(23/5):1569-1571, 1968.

3135 A REPORT ON THIRTEEN BENIGN STOMACH TUMORS. *(Fr.)* Loiseau, J. P. (St. Antoine Hosp., Paris, France), M. Le Fur, Conte-Marti and M. Conte. *Sem. Hop. Paris* 44(23/5):1561-1568, 1968.

3136 CHRONIC GASTRITIS: CLINICAL ASPECTS AND GASTRIC SECRETION. *(Rev.)(Dut.)* Standaert, L. O. (St. Elisabeth Hosp., Antwerp, Belgium). *T. Gastroent.* 11(2):188-197, 1968.

3137 ENDOSCOPIC ASPECTS OF GASTRITIS. *(Rev.)(Fr.)* Jacobs, E. (St. Pierre U. Hosp., Brussels, Belgium). *T. Gastroent.* 11(2):171-187, 1968.

3138 EMPHYSEMATOUS GASTRITIS WITH PERFORATION COMPLICATING PHYTOBEZOAR. *(E.)* Lagios, M. D. (U. California Med. Ctr., San Francisco, Calif.) and M. J. Suydam. *Amer. J. Dis. Child.* 116(2):202-204, 1968.

3139 NEONATAL GASTRIC NECROSIS AND PERFORATION TREATED BY GASTRECTOMY AND ESOPHAGOGASTRIC ANASTOMOSIS. *(E.)* Rees, J. R. (Dept. Surg., New York Hosp.-Cornell Med. Ctr., New York City) and S. F. Redo. *Surgery* 64(2):472-474, 1968.

3140 GASTRITIS AND GASTRIC CANCER: CHRONIC GASTRITIS AS A PRECANCEROUS CONDITION. *(Sp.)* Romero Calatayud, A. (Valencia Provincial Hosp., Spain). *Rev. Esp. Enferm. Apar. Dig.* 27(5):688-704, 1968.

3141 INTRAMURAL MYOID TUMORS OF THE STOMACH. [THREE CASES] *(Fr.)* Aron, E. (Fac. Med., Tours, France), A. Benatre, J. J. Lieffring, B. Roy and J. P. Alfandari. *Arch. Franc. Mal. Appar. Dig.* 57(4/5):425-436, 1968.

3142 RECONSTRUCTIVE SURGERY IN POSTGASTRECTOMY STATES. *(E.)* Kenny, P. J. (St. Vincent's Hosp., Sydney, Australia). *Aust. New Zeal. J. Surg.* 37(3):264-275, 1968.

3143 **ANASTOMOSIS AFTER GASTRECTOMY WITH THE AID OF A ROTARY FORCEPS.** *(Ger.)* Hold, H. (Hanusch Hosp., Vienna, Austria) and H. Wasl. *Zbl. Chir.* 93(17):620-622, 1968.

3144 **ROLE OF CATECHOLAMINES IN THE DEVELOPMENT OF REFLEX DYSTROPHIES OF THE STOMACH WALL.** *(Rus.)* Anichkov, S. V. (Inst. Exp. Med. Leningrad, USSR), I. S. Zavodskaia and Ie. V. Moreva. *Biull. Eksp. Biol. Med.* 64(11):89-91, 1967.

3145 **CHRONIC GASTRITIS: CLINICAL ASPECTS AND GASTRIC SECRETION.** *(Fl.)* Standaert, L. O. (St. Elizabeth Hosp., Antwerp, Belgium). *T. Gastroent.* 11(2):188-197, 1968.

3146 **GASTRITIS: ENDOSCOPIC ASPECTS.** *(Fr.)* Jacobs, E. (St. Pierre U. Hosp., Brussels, Belgium). *T. Gastroent.* 11(2):171-187, 1968.

3147 **SOME ASPECTS OF CHRONIC GASTRITIS.** *(E.)* Schade, R. (Newcastle Gen. Hosp., Newcastle-upon-Tyne, England). *T. Gastroent.* 11(2):164-170, 1968.

See also abstract nos.: 2708,2754,2826,2885,2886,2892,2905,2994,3000

3148 VASCULARITY OF THE MUCOSA OF THE SMALL INTESTINE AFTER VAGOTOMY AND SPLANCHNICECTOMY. *(E.)*

Padula, R. T. (Jefferson Med. Coll., Philadelphia, Pa.), P. H. Noble and R. C. Camishion. *Surg. Gynec. Obstet.* 127(1):41-48, 1968.

This study attempts to explain villous atrophy as secondary to decreased mucosal blood flow as a consequence of vagotomy, with reversal of blood flow to normal following thoracic splanchnicectomy. Five adult mongrel dogs in each of 3 groups were used, Group I having bilateral truncal vagotomy, Group II, bilateral thoracic splanchnicectomy, and Group III, bilateral truncal vagotomy and bilateral thoracic splanchnicectomy. The blood pressure in any one dog remained constant throughout the procedure. In Group I, mesenteric vein blood flow decreased 40% following vagotomy, with the mucosa becoming pale and villous vessels contracting. In Group II, following splanchnicectomy, mesenteric blood flow increased 27%, while mucosal color deepened and its vessels dilated. In Group III, following both procedures, mesenteric blood flow was 96% of control values, with no change in the caliber of the vessels. Three dogs in Group III had measurements taken after vagotomy which showed decreases as in Group I, followed by a return to normal after subsequent splanchnicectomy. Post-vagotomy mucosal ischemia may be related to decreased mesenteric blood flow. After splanchnicectomy, mesenteric blood flow returns to normal, due to reversal of mucosal vasoconstriction.

3149 SMALL BOWEL HEMORRHAGE. *(E.)*

Netterville, R. E. (U. Mississippi Med. Ctr.), J. D. Hardy and R. S. Martin Jr. *Ann. Surg.* 167(6):949-957, 1968.

The diagnosis, etiology and surgical treatment of small intestinal hemorrhage are discussed on the basis of 58 cases, none of whom had peptic ulcer, hemobilia, carcinoma of the ampulla of Vater, or familial telangiectasis. The underlying cause was found to be a benign or malignant tumor in 12 and 18 cases, resp., while 14 patients had intussusception, 7 had Meckel's diverticula and 1-2 had regional enteritis, nonspecific duodenal ulceration, an ileocolic anastomotic ulcer, aortoenteric fistulae, and postoperative bleeding from the suture line. The principal symptoms were anemia, melena and hematemesis, but accurate diagnosis was often possible only after laparotomy. Diagnostic procedures included radiological examination of the small intestine (small bowel series with oral ingestion or intraduodenal instillation of barium, or after instillation of contrast media to the suspicious area), cinefluoroscopy, transfemoral superior mesenteric arteriography, the Einhorn or fluorescein string tests, and aspiration of intestinal contents at various levels followed by tests for the presence of blood (using guaiac or benzidine or after injection of radiochromium-labeled red cells). Special maneuvers which aid in the diagnosis during laparotomy include: inch-by-inch inspection of the small bowel, transillumination of the entire small bowel, endoscopic examination, isolation of segments of bowel to observe filling with blood or to facilitate irrigation or insufflation, "milking" of the bowel to increase intraluminal pressure, Vetto's technique for exerting pressure on the serosal surface of the bowel at a site of suspected hemangioma, eversion or intussusception of the bowel through enterostomies, and i.v. injection of radioactive iodine. Among the 58 patients discussed, 4 could be treated without surgery, 51 were successfully operated (with no operative mortality), and 3 died before an operation could be performed: 1 of pulmonary embolism and 2 (including one patient with aortoenteric fistula and one with an ulcerated Meckel's diverticulum) of massive hemorrhage.

3150 ENTEROHEPATIC CIRCULATION OF C^{14}-LABELED BILE SALTS IN DISORDERS OF THE DISTAL SMALL BOWEL. *(E.)*

Heaton, K. W. (Duke U. Med. Ctr., Durham, N. C.), W. I. Austad, L. Lack and M. P. Tyor. *Gastroenterology* 55(1):5-16, 1968.

The enterohepatic recirculation of sodium glycocholate-24-^{14}C and taurocholate-24-^{14}C (5-7 μC i.v.) was studied in 8 male volunteers (22-25 yr old) and 6 patients (25-79 yr old) with steatorrhea and decreased xylose absorption in order to clarify the localization of the active and passive bile-salt absorption systems in the normal ileum. The patients included 3 with a functional absence of the distal 67% of the small intestine due to jejunocolic fistulae created 4-36 months before for the treatment of obesity, and 3 with lesser abnormalities of the small intestine: one with post-irradiation amyloid of the distal 50% of the jejunoileum and 2 with resection of the distal 33-50% of the small intestine for volvulus. In the normal subjects, the mean half-time for the disappearance of labeled glycocholate and taurocholate was 1.38 and 1.87 days, resp., while the turnover was 533 and 144 mg/day and the exchangeable pool was 1165 and 377 mg, resp. A marked decrease in the exchangeable pool (especially of taurocholate) and in the enterohepatic recirculation of the labeled bile salts was demonstrated in all 6 patients, indicating that the distal third of the small intestine is the chief site for reabsorption of bile salts. Measurements of total radioactivity suggested that there is a tendency for microbial metabolites of taurocholate and glycocholate to persist in the enterohepatic circulation longer than the parent compounds. These metabolites include both deconjugated bile salts (cholate) and reduced deconjugated bile salts (deoxycholate), both of which are reconjugated by the liver. All metabolites disappeared from the enterohepatic circulation of the patients by 48 hr, however. It is suggested that the decreased bile salt recirculation resulting from ileal disorders probably plays a role in the steatorrhea exhibited by these patients.

3151 ENTERIC-COATED POTASSIUM CHLORIDE ENTEROPATHY. *(E.)*

Delaney, T. (U. Cincinnati Coll. Med., Ohio) and P. I. Hoxworth. *Surg. Gynec. Obstet.* 127(1):76-80, 1968.

Nine patients (3 men and 6 women, 38-79 yr old) with ileal enteropathy (7 with stenosing ulceration – 5 of the terminal ileum and 2 of the mid ileum – and 2 with perforation and abscess) due to the ingestion of enteric-coated KCl (in one case after only three 300 mg tablets) are presented in order to illustrate the need for extreme caution with this form of therapy. In 5 of the 9, moreover, administration of KCl was not even indicated on the hospital chart, but was elicited by questioning based on the typical stenosing annular ulcerations with nonspecific inflammation for which there was no apparent cause. These patients required segmental resection (6), resection and ileocolostomy (2) or ileostomy bypass (1). Factors, such as chronic vascular disease or ulcerative colitis, which contribute to susceptibility to KCl are discussed briefly, but it is noted that these are only of academic interest since they are inherent in the diseases for which KCl is most commonly prescribed. It is strongly recommended that safer forms of potassium, such as a solution in sorbitol, glycerol and lactic acid or a timed-release capsule which would disseminate the dose, be substituted for the enteric-coated tablets.

3152 **SMALL INTESTINE IN PROTEIN MALNUTRITION.** *(E.)* Tandon, B. N. (All-India Inst. Med. Sci., New Delhi), M. L. Magotra, A. K. Saraya and V. Ramalingaswami. *Amer. J. Clin. Nutr.* 21(8):813-819, 1968.

Small intestine functional and structural changes induced by protein malnutrition were investigated in 14 anemic, protein-malnourished patients with serum albumin levels of less than 3 g/100 ml. Diarrhea, edema, and impaired D-xylose absorption were evident in 12 cases. Intestinal biopsy specimens revealed histological abnormalities in 10 of 11 cases. Grade 1 lesion, seen in 3 cases, involved villus height reduction and an increase in lamina propria cellular infiltration; grade 2 lesion, characterized by villus height reduction, fusion of villi at the bases, increased crypt height, and marked lamina propria inflammatory cell infiltration, was seen in 3 cases. Severe villus atrophy and significant atypical lining cells characterized grade 3 lesions in 5 patients. Diarrhea subsided and edema, weakness and other clinical symptoms were relieved in all patients after 6 weeks on a 100 g protein diet. D-Xylose absorption returned to normal in 3 patients and was improved in 9; after 12 weeks on the protein diet, D-xylose absorption returned to normal in 5 of the 9 cases showing improvement after 6 weeks. Intestinal mucosa returned to normal in 7 cases and showed significant improvement in 4. Structural and functional disturbances induced by protein deficiency occur in adults as well as children with kwashiorkor. It is suggested that chronic protein malnutrition may be an important factor in the genesis of tropical malabsorption syndrome.

3153 **HYPOGAMMAGLOBULINEMIA WITH NODULAR LYMPHOID HYPERPLASIA OF THE SMALL BOWEL.** *(E.)* Kirkpatrick, C. H. (Kansas U. Med. Ctr. Kansas City, Kansas), D. Waxman, O. D. Smith and R. N. Schimke. *Arch. Intern. Med.* 121(3):273-277, 1968.

A 26-yr-old male patient with severe hypogammaglobulinemia involving the 3 major immunoglobulins was found to have duodenal abnormalities during exploratory laparotomy. The duodenal mucosa had a cobblestone appearance due to hyperplastic lymphoid follicles in the lamina propria; the nodules had well defined germinal centers. Despite immunoglobulin deficiencies, immunological responses to histoplasmin and mumps antigen and the prompt rejection of allogeneic skin grafts indicated that the cellular immunity processes were intact; the patient was able to produce some antibody following stimulation with the Kell blood group and *Salmonella typhosa.* Intestinal malabsorption, noted in other cases of hypogammaglobulinemia, was not evident in this instance.

3154 **SMALL BOWEL INJURY BY ANGIOGRAPHIC CONTRAST MEDIUM.** *(E.)* Sewell, R. A. (VA Hosp., Nashville, Tenn.), D. A. Killen and J. H. Foster. *Surgery* 64(2):459-465, 1968.

The susceptibility of the canine small bowel to direct infusion of 80% sodium iothalamate into the superior mesenteric artery is evaluated and 1 observed clinical case of small bowel injury in a 54-yr-old male patient is presented. Contrast medium was injected into the exposed, ligated superior mesenteric artery of 24 dogs, half of which received 1 ml/kg, and the other half, 2 ml/kg. Surviving animals were killed 2-4 weeks postoperatively and autopsy was performed. Ligating tape was removed immediately after injection. There was immediate blanching and spasm of the perfused bowel segment; normal appearance was retored in 2 min. One dog receiving 1 ml/kg of sodium iothalamate died 2 days postoperatively and, upon examination, was found to have jejunal intussusception with bloody distention of the involved segment. One animal receiving 2 ml/kg died postoperatively of undetermined causes. There was no other histological evidence of injury in experimental dogs. The patient suffered injury after accidental injection of contrast medium into the superior mesenteric artery. The small bowel injury may have resulted from the mechanical vascular trauma produced by the high pressure injection of a large volume of fluid into a limited vascular space and not by the contrast medium toxicity *per se.*

3155 **POSTAPPENDECTOMY FISTULA DUE TO RESIDUAL FECALITH.** *(E.)* Goldman, W. (Upstate Med. Ctr., Syracuse, N. Y.), T. Perl and E. L. Sarason. *Amer. J. Roentgenol.* 103(2):351-353, 1968.

3156 **ROENTGEN FINDINGS IN DELAYED DIAGNOSIS OF APPENDICITIS.** *(E.)* Mayson, P. B. Jr. (93rd Evacuation Hosp., San Francisco, Calif.) and S. J. Rosenthal. *Amer. J. Roentgenol.* 103(2):347-350, 1968.

3157 **INTRALUMINAL DIVERTICULUM OF THE DUODENUM IN A CHILD.** *(E.)* Newman, A. (Baptist Hosp. Scottsdale, Ariz.) and M. H. Nathan. *Amer. J. Roentgenol.* 103(2):326-329, 1968.

3158 **JEJUNOGASTRIC INTUSSUSCEPTION TEN YEARS AFTER GASTRIC SURGERY.** *(E.)* Dolan, D. D. (Newton Road, Iowa City) and R. E. Hoekman. *J.A.M.A.* 205(3):128-130, 1968.

3159 **GASTROINTESTINAL BLEEDING FROM ILEAL ULCERATIONS IN HISTIOCYTOSIS X.** *(E.)* Pops, M. A. (Health Sci. Ctr., U. California, Los Angeles) and T. Campbell. *Arch. Intern. Med.* 122(3):271-272, 1968.

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3160 **AN APPENDIX TO SMALL-INTESTINAL BLEEDING!** *(E.)* Levine, S. M. (Laval U., Quebec, Canada) and J. Morin. *Amer. J. Dig. Dis.* 13(9):810-812, 1968.

3161 **THE DIAGNOSIS AND CONSERVATIVE MANAGEMENT OF ACUTE CAECAL DIVERTICULITIS AND ACUTE CAECAL ULCER.** *(E.)* Conrad, P. (Sydney, Australia). *Aust. New Zeal. J. Surg.* 37(4):351-353, 1968.

3162 **ILEITIS AND ULCERATION OF THE SMALL GUT AFTER ILEOSTOMY.** *(E.)* Lane, D. (Mater Misericordia Hosp., Brisbane, Australia). *Aust. New Zeal. J. Surg.* 37(4):354-359, 1968.

3163 **PRIMARY TUMOURS OF THE SMALL INTESTINE.** *(E.)* Thomas, D. (Melbourne, Australia). *Aust. New Zeal. J. Surg.* 37(4):359-362, 1968.

3164 **PERFORATED DIVERTICULUM OF THE DUODENUM AND ITS TREATMENT.** *(E.)* Desmond, A. M. (London, England) and R. J. Heald. *Brit. J. Surg.* 55(5):396-397, 1968.

3165 **LIPOMA OF DUODENUM. REPORT OF A CASE.** *(E.)* Lukash, W. M. (Naval Hosp., Nation. Naval Med. Ctr., Bethesda, Md.), D. P. Osborne, L. T. Brown and J. F. Russo. *Amer. J. Gastroent.* 49(6):494-498, 1968.

3166 **INTESTINAL ABSORPTION AFTER GASTRECTOMY AND AFTER VAGOTOMY COUPLED WITH AN ANASTOMOSING PROCEDURE.** *(E.)* Cichecka, K. (Dept. Int. Dis., Krakow, Poland), M. Dabrowski, H. Drozdz, A. Jedrychowski, S. Kirchmayer and M. Mysik. *Pol. Med. J.* 7(2):299-307, 1967.

3167 **SIMULTANEOUS ACUTE JEJUNAL DIVERTICULITIS AND NONOCCLUSIVE MESENTERIC INFARCTION OF THE ILEUM.** *(E.)* Becker, S. M. (Perth Amboy Gen. Hosp., N. J.), P. F. Zito and A. Niemiera. *Amer. J. Gastroent.* 49(6):471-477, 1968.

3168 **THREE CASES OF MALIGNANT DUODENAL TUMORS.** *(Fr.)* Courbier, R. (Marseille, France) and J. Simoni. *Mem. Acad. Chir.* 94(16/17):477-478, 1968.

3169 **MECKEL'S DIVERTICULUM: A 10-YEAR REVIEW OF 218 CASES.** *(E.)* Seagram, C. G. F. (Hosp. Sick Child. Toronto, Ontario), R. E. Louch, C. A. Stephens and P. Wentworth. *Canadian J. Surg.* 11(3):369-373, 1968.

3170 **INTESTINAL OBSTRUCTION BY A FECALITH IN A MECKEL'S DIVERTICULUM.** *(E.)* Badruddoja, M. (Highland Park Gen. Hosp., Mich.), D. B. Jury and J. A. Witter. *Canadian J. Surg.* 11(3):385-387, 1968.

3171 **TRAUMATIC INJURIES TO THE SMALL BOWEL.** *(Rev.)(E.)* Cantor, M. O. (Detroit, Mich.). *J. Abdom. Surg.* 10(8):205-212, 1968.

3172 **ULCERATIVE STENOSIS OF THE SMALL INTESTINE FOLLOWING INGESTION OF POTASSIUM. [CASE REPORT]** *(Fr.)* Hillemand, P. (Paris, France), A. Bensaude, P. Delavierre and L. Debbasch. *Bull. Soc. Med. Hop. Paris* 119(3):241-245, 1968.

3173 **PRIMARY NONSPECIFIC ULCER OF ILEUM PRESENTING WITH MASSIVE RECTAL HEMORRHAGE.** *(E.)* Shah, M. J. (Friarage Hosp., Northallerton, England). *Brit. Med. J.* 3(5616):474, 1968.

3174 **THE SURGICAL MAINTENANCE OF THE ILEO-CAECAL JUNCTION.** *(E.)* Gazet, J. C. (Guy's Hosp., London, England). *Ann. Roy. Coll. Surg. Eng.* 43(1):19-38, 1968.

3175 **DUODENAL CARCINOMA.** *(Sp.)* Pujol Soler, R. *An. Med. (Med.)* 54(1):41-49, 1968.

3176 **RECURRENT ILEUS OF THE SMALL INTESTINE DUE TO INTRAPERITONEAL GRANULOMA. [CASE REPORT]** *(Ger.)* Wurnig, P. (Mautner-Markhof Child. Hosp., Vienna, Austria) and E. Zandanell. *Z. Kinderchir.* 6(1):39-48, 1968.

3177 **TRANSDUODENAL SPHINCTEROTOMY: STUDY OF 160 CASES -- INDICATIONS, TECHNIQUE, RESULTS.** *(It.)* Grassi, G. (Consolidated Hosps., Rome, Italy), S. Broglia and A. Dell'Osso. *Policlin.* 75(3):172-190, 1968.

3178 **MASSIVE SMALL BOWEL RESECTION: EXPERIMENTAL TRIAL.** *(Sp.)* Velasco Fernandez, I., M. Villagarcia, V. Gutierrez and J. Rollino. *Acad. Peru. Cirug.* 19(4):215-220, 1967.

3179 **FETAL PERITONITIS AND MULTIPLE PERFORATIONS OF THE SMALL BOWEL IN NEWBORN INFANTS.** *(It.)* Pilotti, G. (Mauriziano Umberto Hosp., Turin, Italy). *Minerva Nipiol.* 17(2):27-32, 1967.

See also abstract nos.: 2733,2981,3002,3110,3186

3180 A STUDY OF GASTRIC SECRETION IN DUODENAL ULCER: HCl OUTPUT UNDER BASAL CONDITIONS AND AFTER HISTAMINE, INSULIN, OR PHARMACOLOGICAL VAGOTOMY.

(Cz.) Pelikán, V. (Med. Fac., Purkinje U., Olomouc, Czechoslovakia) and V. Horčička. *Cesk. Gastroent. Vyz.* 22(2):103-110, 1968.

On the basis of the basal gastric acid secretion and the response to the augmented histamine test, 106 patients with radiologically diagnosed duodenal ulcer could be divided into 4 groups: 28 with both basal and histamine-induced hyperacidity (Group I), 16 with normal basal secretion but an increased response to histamine (Group II), 27 with basal hyperacidity and a normal response to histamine (Group III), and 35 with normal acid output both under basal conditions and after histamine (Group IV). Further studies were then carried out to determine the effects of pharmacological vagotomy (50 mg of hexamethonium + 0.3 mg of atropine) and to compare the response to histamine with that to insulin. The gastric acid output after i.v. insulin was above normal in 2 of 8 patients with normal basal secretion and in 7 of 11 with basal hyperacidity, although in many cases the values were borderline. Comparison of the histamine and insulin responses showed parallel results only in Group IV. Acid output after insulin was above normal in 3 of 5 in Group III and in only 6 of 10 in Groups I & II (with hyperacidity in response to histamine). After pharmacological vagotomy, basal acid output decreased in all cases (including 8 patients in Groups II & IV), and was normalized in 8 of 10 patients with basal hypersecretion (Groups I & III). The response to histamine was also decreased in all cases after pharmacological vagotomy, the decrease amounting to 34.2-67.6% in 16 of 18 cases and 11-18% in the other two (both in Group III). The interpretation of these findings will require more detailed knowledge as to the mechanisms of action of the nervous and humoral factors which play a role in the etiology of gastric hypersecretion.

3181 EFFECT OF COMMON BILE-DUCT TRANSPLANTATION ON GASTRIC ACID SECRETION IN THE DOG.

(E.) Breen, J. J. (Dept. Surg., U. Minnesota Med. Sch., Minneapolis), E. Molina and W. P. Ritchie. *Brit. J. Surg.* 55(4):282-284, 1968.

This study was undertaken to determine if hypersecretion of gastric acid might play a role in the genesis of post-choledochojejunostomy ulcers. Twelve healthy mongrel dogs were provided with a denervated Heidenhain pouch. Following recovery, 24-hr acid production in response to a 200 gm meat meal was assayed daily for at least 30 days. Dogs were weighed and subjected to 1 of 3 procedures. Group I, the control dogs, consisted of 2 dogs in which choledochocholedochostomies (end-to-end) were performed. Group II consisted of 5 dogs having a Roux-en-Y choledochojejunostomy (end-to-side); the blind jejunal loop was 30 cm in length and the jejunojejunal anastomosis was made 20 cm from the ligament of Treitz. In Group III, 5 dogs had a choledochoduodenostomy; no tubing or splints were used. Following recovery, acid secretion was analyzed as before. Laparatomy was performed in Groups I and II to obtain bile-duct intraluminal pressures, cholangiograms, and liver biopsies. All dogs in Group II showed an increase in production when compared to control values in the same animals; the increase was highly significant in 4 animals. In Group III, gastric acid secretion increased in 3 and decreased in 2; these results were not statistically significant. In Group I, no significant changes were observed. Liver biopsies and cholangiograms were unremarkable. No weight loss occurred in Groups I and III, but Group II dogs averaged a 7 lb. weight loss. No strictures or ulcers were found in any of the animals at post-mortem. This study indicates that, in dogs, a Roux-en-Y choledochojejunostomy is associated with the hypersecretion of acid from a Heidenhain pouch, whereas choledochoduodenostomy and choledochodochostomy are not associated with increased acid secretion. No dog undergoing choledochoduodenostomy developed cholangitis.

3182 GASTRODUODENAL PERFORATION, WITH CONCLUSIONS ON THE ROLE OF DEFINITIVE SURGERY.

(E.) Maynard, A. de L. (Harlem Hosp. Ctr., New York City), C. J. L. Froix and G. Oropeza. *Arch. Surg.* 97(1):96-104, 1968.

Among 105 patients (88 males and 17 females, 2-82 yr old, with 7 below 20 yr and 19 above 60 yr) with perforated peptic ulcers, out of 372 surgical admissions for peptic ulcer in a 17-month period, 86 had duodenal ulcers, 18 had gastric ulcers (including 1 due to cancer and 1 infant with a Curling's ulcer), and one had a marginal ulcer of an afferent jejunal loop. The diameter of the perforation was 0.5-3.5 cm in the stomach, while in the duodenum 22% were 0.6-2.0 cm in diameter and 78% were less. Bleeding was associated with the perforation in 8 of the duodenal ulcer cases. A total of 84 patients was treated within 24 hr after perforation, including 31 of 48 treated by suture closure and 42 of 54 treated by gastrectomy. The most significant diagnostic finding was pneumoperitoneum on the X-ray (present in 91 cases originally and in 8 others on a 2nd X-ray 2-4 hr later); the serum amylase was elevated in 11 cases. Only 6 cases were not immediately diagnosed correctly (3 misdiagnosed as acute appendicitis, 2 as acute cholecystitis, and 1 as pelvic inflammatory disease). Suture closure with vascularized omentum reinforcing the plication was used in 48 cases, with a mortality of 25%. Emergency gastrectomy was used in 54 cases (49 with a 70% gastric resection and 5 with antrectomy plus bilateral vagotomy), with a mortality of 1.85% (1 death, a 79-yr-old man with gastric perforation operated on 28 hr after the event). The other 3 patients, all with "formes frustes" types of duodenal ulcers, were treated by nasogastric suction, and all 3 recovered. The deaths were due mostly to bacterial peritonitis with resultant shock, cardiovascular collapse and pulmonary insufficiency, and included 7 duodenal and 5 gastric cases as well as the patient with a marginal ulcer. Nonfatal complications, which were also more common after suture closure than after gastrectomy, included pneumonitis (13 cases), adynamic ileus (11), delirium tremens (11, due to the fact that about 30% were alcoholics), peritonitis (6), congestive heart failure and pulmonary edema (3), wound dehiscence (2), and pulmonary infarction, pyloric stenosis, wound infection, and mechanical small bowel obstruction (1 each). It is concluded that emergency gastrectomy is not to be feared, although it is contraindicated by generalized bacterial peritonitis, suppuration in the region of the perforation, or serious systemic disease. Gastrectomy should generally be carried out early, in the first 6-8 hr after perforation, but only after full evaluation of the local and peritoneal findings. The selective use of suture closure, gastrectomy with or without vagotomy, and nasogastric suction is urged, and it is pointed out that the latter procedure can be of definite value in inoperable cases (case reports of two successfully-treated moribund cases are presented).

3183 **PEPTIC ULCER OF THE JEJUNUM.** *(Pol.)* Kwiatek, R. (2nd Surg. Clin., Acad. Med., Poznan, Poland). *Poznan Tow. Przyjac Nank Wydz Lek* 37:81-105, 1968.

During the period 1945-65, 61 patients (54 men and 7 women, 26-65 yr old) were treated for recurrent peptic ulcer of the jejunum, including 51 who had previously been treated for duodenal ulcer and 10 previously treated for gastric ulcer. The group included 14 of 2041 patients subjected to gastrectomy during that period, a recurrence rate of 0.65%. The patients had been 18-63 yr old at the time of the first operation for ulcer, and symptoms of recurrence developed from a few days to 30 yr postoperatively (within the 1st yr in 34 cases and within 1-10 yr in 25). The previous operation had been gastroenterostomy with or without suture in 24 cases, a Finsterer or Devin gastrectomy in 19, and a Hoffmeister-Finsterer, Polya-Reichel or Rydygier gastrectomy in 18. Symptoms of recurrence included epigastric pain (58 cases), gastrointestinal bleeding (33), heartburn and sour belching (42), weight loss (28), nausea and vomiting (18), anorexia (36), and diarrhea or constipation (27). The erythrocyte sedimentation rate was elevated to an average of 25/50 mm, and most patients were anemic (hemoglobin usually 60-70%, with 3.2-3.8 million RBC, but in 2 cases hemoglobin was 16-27% of normal). The diagnosis of jejunal ulcer was confirmed by X-ray in 43 cases. In 5 cases, the ulcer was in the afferent loop, while 29 had an ulcer in the efferent loop and 28 had one in the anastomosis (1 patient had two ulcers). Treatment was by vagotomy alone in 12 cases and by gastrectomy plus gastroenterostomy in 49 (9 of these also had partial vagotomy). Particular care was taken to excise any residual prepyloric gastric tissue, in order to abolish the frequent gastric hyperacidity. Surgical examination revealed that 11 patients had penetration of the ulcer into neighboring organs, 3 had a fistula between the anastomosis and the colon, 4 showed perforation, and 1 showed malignant degeneration. The mortality rate was 6.5% (4 deaths), and 11 required 2-3 operations for recurrences. Follow-up studies by either clinical examination or questionnaire in 48 cases revealed that 40 were well, 2 were in fair condition, 2 had died of unrelated causes, and 4 were in poor condition (3 of 4 with recurrences). The development of a jejunal ulcer following peptic ulcer surgery is ascribed to residual hyperacidity and/or a poorly constructed anastomosis, although in some cases pancreatic tumors are responsible (Zollinger-Ellison syndrome).

3184 **A CURRENT EVALUATION OF THE PROBLEM OF GASTRIC ULCERS.** *(E.)* Angel, R. T. (Baylor U. Coll. Med., Houston, Tex.), J. W. Giacobine and G. L. Jordan Jr. *Amer. J. Surg.* 114(5):730-735, 1968.

Of 267 patients between the ages of 22 and 81 years who had gastric ulcer (80 also had duodenal ulcer), 196 initially received medical treatment and 71 received surgical treatment (gastrectomy) without prior medical treatment. Medical treatment produced acceptable results in 37% of the patients. Seventy-two ultimately underwent gastrectomy. Thirty-nine had severe symptoms, often with complications, but did not undergo surgery. Ten died from complications. Of those who underwent surgery, good or excellent results were achieved in 94.9%. No deaths occurred in patients who had an elective surgical procedure. All deaths (5) occurred in patients with hemorrhage or perforation. The overall mortality rate for patients who received nonoperative treatment exceeded significantly the mortality for those having gastric resection, even including those patients operated upon under emergency conditions.

3185 **CLINICAL COMPARISON OF VAGOTOMY AND PYLOROPLASTY WITH OTHER FORMS OF ELECTIVE SURGERY FOR DUODENAL ULCER.** *(E.)* Goligher, J. C. (General Infirmary, Leeds, England), C. N. Pulvertaft, F. T. de Dombal, C. G. Clark, J. H. Conyers, H. L. Duthie, D. B. Feather, A. J. C. Latchmore, T. S. Matheson, J. H. Shoesmith, F. G. Smiddy and J. Willson-Pepper. *Brit. Med. J.* 2(5608):787-789, 1968.

The immediate outcome and clinical results of elective truncal vagotomy and Heineke-Mikulicz pyloroplasty in the treatment of 175 duodenal ulcer patients are reviewed. Acute cardiac failure claimed the lives of 2 patients in the immediate postoperative period; 4 patients died after discharge from the hospital of causes unrelated to the gastrointestinal surgery. Although 11 other patients were unavailable for the 2-yr follow-up study, the clinical results of 158 patients are reported and analyzed. The results are compared with those of other patients who had undergone other surgical procedures. Bilious regurgitation occurred less frequently after vagotomy-pyloroplasty than after any other surgical technique. Epigastric fullness, flatulence, and nausea were found more often after vagotomy-pyloroplasty than after other procedures. There was a 6.3% ulcer recurrence rate after vagotomy-pyloroplasty, as compared to a 3.6% incidence rate after vagotomy-gastroenterostomy. Overall assessment (Visick grading) of the surgical outcome gave poorer results for vagotomy-pyloroplasty than any other method; the difference as compared with vagotomy-antrectomy or subtotal gastrectomy was statistically significant but when compared with vagotomy-gastroenterostomy, significance was not noted.

3186 **SIMULTANEOUS OCCURRENCE OF PERFORATION IN ONE GASTRIC ULCER AND MASSIVE HEMORRHAGE IN ANOTHER.** *(E.)* Lazaro, E. J. (Newark City Hosp., New Jersey) and P. B. Das. *Amer. J. Gastroent.* 49(6):484-487, 1968.

Exploratory laparotomy performed under general anesthesia on a 59-yr-old male patient revealed a perforated 5 mm ulcer in the prepyloric area. Antrectomy and end-to-side gastroduodenostomy were performed. Sectioning the proximal portion of the stomach revealed a 1 cm ulcer that was apparently responsible for the bleeding encountered. The postoperative course was uneventful; histological examination of the ulcers showed them both to be benign.

3187 LATE UNTOWARD SEQUELAE OF SURGERY FOR DUODENAL ULCER. *(E.)*

Welch, C. E. (Harvard Med. Sch., Boston, Mass.). *Bull. Mason Clin.* 22(2):39-57, 1968.

A review of the surgical records of the Massachusetts General Hospital for the period 1952-57, with a follow-up of at least 5 yr on all patients, revealed that gastric resection without vagotomy for duodenal ulcer (usually a distal partial gastrectomy with 75% resection) produced good-excellent results in 85% (221 out of 261 cases); however, there were 13 "fair" results (including 5 with postoperative hemorrhage, 4 with dumping and 3 with severe weight loss), 3 postoperative deaths, and 24 "poor" results, the latter due overwhelmingly (20 of 24) to recurrent anastomotic ulcer. The operative mortality for gastric resection in 1952-62 was only 1.3% (5 of 183 cases), and none of the 41 patients treated by gastroenterostomy or resection plus vagotomy died. However, during the period 1915-66, 326 cases of recurrent anastomotic ulcer were seen at the hospital, 239 of which required a second operation. Among 145 patients followed for up to 5 yr after such a 2nd operation, 104 (72%) had very good-excellent results, 11 had "fair" results but did not require reoperation, and 30 had "poor" results (including 26 with recurrent ulcer and 3 with hemorrhage); 18 of the 30 patients were reoperated (2 of 18 by total gastrectomy), with an operative mortality of 3%, and 13 of these 18 finally obtained an excellent result. Based on this experience and on reports in the literature, particularly by Smithwick, increased attention has been given in more recent years to vagotomy for the prevention of hyperacidity and recurrent jejunal ulcers. The operation of choice is now considered to be a 50-60% gastrectomy plus bilateral vagotomy, and there seems to be no question that the antrum must be excised if anastomotic ulcers are to be avoided. The other complaints which may follow gastric resection for duodenal ulcer can be divided into two large groups: mechanical defects occurring around an anastomosis, and physiological changes occurring in the presence of an apparently normal anastomosis. Some of these mechanical defects and the techniques for their surgical correction are briefly discussed. Attention is also given to some of the unusual anastomoses which have been suggested for the surgical correction of the dumping syndrome. It is concluded that the problem of recurrent ulcer can be alleviated, although not eliminated, by the use of limited gastrectomy plus vagotomy, and that those anastomotic ulcers which do occur can generally be treated successfully by reoperation.

3188 FIVE- TO EIGHT-YEAR RESULTS OF LEEDS/YORK CONTROLLED TRIAL OF ELECTIVE SURGERY FOR DUODENAL ULCER. *(E.)*

Goligher, J. C. (Gen. Infirm., Leeds, England), C. N. Pulvertaft, F. T. de Dombal, J. H. Conyers, H. L. Duthie, D. B. Feather, A. J. C. Latchmore, J. H. Shoesmith, F. G. Smiddy and J. Willson-Pepper. *Brit. Med. J.* 2(5608):781-787, 1968.

Between April of 1959 and midsummer of 1962, 375 male and 77 female patients with duodenal ulcer were assigned at random to 3 operative groups for elective surgery: a) total subdiaphragmatic vagotomy and a posterior no-loop or short-loop gastroenterostomy; b) vagotomy and antrectomy (distal third or half gastrectomy completed by the Polya technique); c) subtotal gastrectomy (two-thirds or three-quarters resection with Polya reconstruction). An additional 132 male and 50 female patients were rejected for inclusion in the controlled study, and most of these were also treated by vagotomy and gastroenterostomy. There was no operative mortality, although 28 males and 7 females died subsequently and 17 males and 9 females were lost to follow-up. A review of the 342 traced male patients, 5-8 yr postoperatively, showed that most "post-gastric operation syndromes" occurred with approximately the same frequency after all 3 types of operation; although early dumping was slightly more common and severe after subtotal gastrectomy, it very rarely assumed crippling proportions. Diarrhea was definitely more common after vagotomy than after gastrectomy, but most of it was very slight and episodic, so that it was only rarely a source of disability. There was a significantly greater loss of weight after gastrectomy or vagotomy and antrectomy than after vagotomy and gastroenterostomy, which may reflect a different incidence of malabsorption. Recurrent ulcers were diagnosed in 7-10% after vagotomy and gastroenterostomy and in 2-6% after the other 2 procedures. An overall assessment of the results after the 3 operations (Visick grading) showed that vagotomy and antrectomy or subtotal gastrectomy were slightly superior to vagotomy and gastroenterostomy, but the difference was not statistically significant. The results of all 3 procedures tended to deteriorate gradually with time, and it is difficult to judge whether the lower recurrence rate after gastrectomy would justify the higher risk of operative mortality. Among 66 female patients receiving vagotomy and gastroenterostomy (most having been rejected from the controlled trial), the incidence of bile vomiting, nausea, epigastric fullness and food vomiting was significantly higher than among 215 male patients treated in the same way (including 96 rejected cases and 119 from the controlled trial); the incidence of these symptoms varied from 15.6 to 56.9% in females and from 4.3 to 39.0% in males. The incidence of recurrent ulcer was 9 and 5%, resp., and the percentage of category IV cases by Visick grading was 22 and 14%, resp., indicating that the results of this operation are significantly better among males.

3189 SHOULD SIMPLE DUODENAL ULCER BE TREATED BY GASTRECTOMY OR BY THE DRAGSTEDT PROCEDURE? *(Fr.)*

Barrie, J. (Reg. Hosp. Ctr., Grenoble, France), J. Miguet, R. Latreille, J. J. Bocchio and J. Ronzy. *Lyon Chir.* 64(3):341-348, 1968.

A comparison of the long-term results of duodenal ulcer surgery in 37 patients treated by Pean gastroduodenectomy and 64 patients receiving truncal vagotomy between 1952 and 1966, all initially free of complications and followed for 1-14 yr postoperatively, demonstrated the effectiveness of the Dragstedt procedure, especially when combined with antrectomy (7 cases). Persistent digestive symptoms were more common after vagotomy + gastroenterostomy (52 cases) or pyloroplasty (5 cases). There were only 3 operative deaths (1 after Pean gastrectomy and 2 after vagotomy + gastroenterostomy, yielding mortality rates of 2.5 and 4%, resp.). Abdominal distension, peritonitis, evisceration and severe pulmonary complications were seen only after gastrectomy or gastroenterostomy (total incidence 17%), although 1 patient developed benign pulmonary complications after antrectomy. Only a limited number of patients responded to the follow-up questionnaires: 13 treated by gastroduodenectomy, 12 by vagotomy + gastroenterostomy, 3 by vagotomy + pyloroplasty and 5 by vagotomy + antrectomy. Recurrences were reported only in 3 of 13 and 2 of 12 (the latter both gastric ulcers). Although dietary habits were normalized in at least 4 of 5 receiving antrectomy, some restrictions remained necessary in 30-50% of the other groups. Late post-gastrectomy symptoms appeared in 2-7 of 13 treated by gastroduodenectomy, 3-6 of 12 receiving gastroenterostomy, 1-2 of the 3 receiving pyloroplasty, and none of the 5 receiving antrectomy. The results of classic Finsterer gastrectomy in 204 patients treated between 1947 and 1951 (including 110 patients with duodenal ulcer) are cited for purposes of comparison: in this group the operative mortality was 0.5%, minor complications appeared in 5%, recurrent ulcers developed in 2%, and late post-gastrectomy symptoms were reported by 2-2.5%. The Dragstedt procedure, although effective and relatively safe, is thus far from harmless when compared to the results of classic gastrectomy.

3190 **THE EFFECT OF THE COMBINED ANTACID-ANTICHOLINERGIC TREATMENT ON THE INTRAGASTRIC pH IN PEPTIC ULCER DISEASE.** *(E.)* Marcussen, J. M. (County Hosp., Voss, Norway) and Vilsvik. *Scand. J. Gastroent.* 3(2):170-176, 1968.

Intragastric pH measurements were used to study the effects of antacids and anticholinergic agents in 11 duodenal ulcer patients, 1 gastric ulcer patient, 1 gastritis patient, and 1 dyspepsia patient. Two antacid treatments were used, 1 consisting of 15 ml of a 100-ml suspension containing 6.2 g of aluminum hydroxide, 3.8 g of magnesium hydroxiden and 6.3 g of aluminum hydroxide-magnesium carbonate, and the other containing 15 g of the latter and 1.5 g of aminoacetic acid; treatment was given 3 times daily. Anticholinergic supplement was given for 1 week after antacid treatment, and consisted of 0.6-0.8 mg/day of 1-hyoscyamine or 45-60 mg/day of propantheline bromide. Treatment effects on intragastric pH were indicated at pH 3.5 and 4.5; mean duration of responses of 4 min were seen in 7 patients at pH 3.5 and 1½ min in 4 patients when the pH exceeded 4.5. One patient showed poor response and 1 failed to respond to the combined treatment. In the remaining 12 cases it was possible to record a reproducible pattern of reactions. Antacid given while anticholinergic influences were still in effect raised the pH and prolonged it. At pH 3.5, the duration increased from 4 to 38 min; at pH 4.5 the duration was prolonged from 1½ min to 23 min. The effect of combined treatment was more pronounced in the gastric ulcer patient and the patient with peptic ulcer symptoms. A second rise in intragastric pH was observed in some cases with 1-hyoscyamine and antacid, but not with antacid and propantheline. The data show a significant negative correlation between fasting pH before treatment with 1-hyoscyamine and the pH increase after treatment. In duodenal ulcer disease antacids alone are unable to influence intragastric pH for more than a few min. The effect of combined treatment is probably more pronounced due to the special sustained release preparation of 1-hyoscyamine used.

3191 **THE IMPORTANCE OF GIANT DUODENAL ULCER.** *(E.)* Kirsh, L. E. (VA Hosp., Hines, Ill.) and T. Brendel. *Radiology* 9(1):14-19, 1968.

Case reports of 6 patients with giant duodenal ulcers are presented. The radiological diagnosis of giant duodenal ulcers (over 2 cm) has been difficult due to their roentgenographic similarity to the duodenal bulb when visualized with barium. Radiologically, the ulcer crater has no mucosal folds, does not change in size and shape, and tends to remain filled due to stenosis beyond the crater. The ulcer produces a pressure defect on the gastric antrum and the third portion of the duodenum. The condition is thought to be rare, and only 42 cases have been reported in the literature. However, 30 cases have been cited by this investigator in a 5-yr period; 25 had been correctly diagnosed. Familiarity of radiologists with the characteristics of giant duodenal ulcers will aid in early recognition and improve its prognosis by making possible early treatment.

3192 **MANAGEMENT OF DUODENAL ULCER BY VAGUS RESECTION AND PYLOROPLASTY.** *(E.)* Burdette, W. J. (U. Utah Coll. Med., Salt Lake City), B. L. Rasmussen and W. K. Fitzpatrick. *Surg. Gynec. Obstet.* 127(3):513-522, 1968.

A consecutive series of 304 patients with duodenal ulcers, 224 men in a veterans hospital and 55 men and 25 women in a county hospital, were treated with subdiaphragmatic truncal vagal resection and pyloroplasty. Eight of 11 postoperative deaths followed emergency operations for massive hemorrhage. Eight of 10 patients with recurrent ulcers had a second operation; 2 were managed medically. A late positive finding after a Hollander test was present in 3 patients with recurrent ulcers. The results of treatment of the 224 veterans when compared to the results of treatment of 50 veterans which consisted of vagus resection and antrectomy, suggests that the results are more favorable with the latter procedure, with no increase in mortality.

3193 **GASTRIC SECRETORY STUDIES IN PATIENTS UNDERGOING CHRONIC HEMODIALYSIS.** *(E.)* Schupak, E. (Brooklyn-Cumberland Med. Ctr., N. Y.) and J. Ferayorni. *Amer. J. Dig. Dis.* 13(8):747-752, 1968.

To understand the etiology of peptic disease and the possible relationship between it and gastric secretion in a chronically hemodialyzed population, basal gastric secretion and total titratable acidity were measured in 11 patients. Secretory volume and acidity were found to be abnormally low in 10 of the patients. Following betazole stimulation, volume and acidity increased normally, while the pH decreased from a mean value of 5.03 to 1.21 60 min after stimulation. One papatient has peptic disease; he also manifested basal hyperacidity. Factors other than gastric acidity contribute to peptic disease in chronically hemodialyzed patients.

3194 **ABNORMAL METABOLIC RESPONSE TO GLUCOSE IN THE PRESENCE OF RAPID SMALL BOWEL TRANSIT.** *(E.)* Stemmer, E. A. (VA Hosp., Long Beach, Calif.), S. Chiu, R. E. Heber and J. E. Connolly. *Surgery* 64(1):192-203, 1968.

In anesthetized dogs with a Mann-Bollman type of distal duodenal-cutaneous fistula, which leaves the pylorus intact, instillation of 200 cc of 50% glucose into the duodenum consistently produced a rapid small intestinal transit time, a "postgastrectomy" type of glucose tolerance curve, and an exaggerated plasma insulin response which was markedly disproportionate to the rise in blood glucose. On the other hand, no such response followed intragastric instillation of the same dose of glucose (peak glucose of 105 mg% and peak insulin of 155 μU/ml in 143 and 55 min, resp., compared to 166 mg% and 489 μU/ml in 53 and 70 min, resp., after intraduodenal instillation). After interposition of a 4-6 cm antiperistaltic segment of jejunum 15 cm distal to the ligament of Treitz in the same dogs, the response to intraduodenal glucose was altered considerably in the direction of normal (peak glucose of 125 mg% and plasma insulin of 195 μU/ml in 72 and 65 min, resp.). Among 6 patients who had received vagotomy and pyloroplasty for duodenal ulcer at least 2 yr before, only the 2 with actual dumping syndrome (both vasomotor and gastrointestinal symptoms after eating) responded to a high-carbohydrate test meal with an abnormally high glucose-tolerance curve and markedly elevated plasma insulin levels; 3 showed a normal glucose and insulin response, and 1 patient showed a borderline elevation of plasma insulin. One of the 2 with abnormal responses was then subjected to an interposition operation (6-cm antiperistaltic segment of jejunum inserted between the stomach and duodenum), after which the small intestinal transit time was increased and the glucose and insulin levels following a test meal were decreased towards normal values (peak glucose of 115 mg% and plasma insulin of 285 μU/ml compared to 192 mg% and 670 μU/ml, both after 30 min, before the operation). There were no significant abnormalities in histamine, serotonin or catecholamine levels in either the dogs or the patients. It is concluded that insulin plays a role in the dumping syndrome, and that serial determination of plasma insulin levels after a high-carbohydrate test meal may be a useful way of identifying patients with a true dumping syndrome, who could be expected to benefit from an interposition operation. In the discussion, however, attention is called to the possibility that the abnormal metabolic insulin response to intraduodenal glucose is due to stimulation of pancreatic insulin secretion by secretin, rather than being related to rapid small bowel transit.

3195 **HEPARIN INHIBITION OF PEPTIC SECRETION. CLINICAL STUDY.** *(Sp.)* Cavina, E. (Inst. Gen. Clin. Surg., U. Pisa, Italy), G. F. Caldarelli and M. Falaschi. *Osped. Ital. Chir.* 17(6):679-688, 1967.

3196 **TOTAL GASTRECTOMY FOR ULCERS WITH RESUSCITATION.** *(Fr.)* Michel, A. J. D. (Lyon), J. Culleret, J. Dubois and G. Bransillon. *Ann. Anest. Franc* 9(1):93-99, 1968.

3197 **MISTAKES IN PEPTIC ULCER SURGERY IN THE EARLY YEARS: A PHYSIOLOGIC ANALYSIS.** *(E.)* Dragstedt, L. R. (Dept. Surg., U. Florida, Gainesville) and E. R. Woodward. *Ann. Surg.* 167(6):886-900, 1968.

3198 **EXPERIMENTAL PEPTIC ULCER.** *(Rev.)(E.)* Brodie, D. A. (Merck Inst. Ther. Res., West Point, Pa.). *Gastroenterology* 55(1):125-134, 1968.

3199 **PEPTIC ULCER OVER THE PAST ONE HUNDRED YEARS.** *(E.)* Pollard, H. M. and N. A. Augur Jr. *Practitioner* 201(1201):139-146, 1968.

3200 **THE EFFECTS OF DRUGS ON THE PRODUCTION AND RECOVERY PROCESSES OF THE STRESS ULCER.** *(E.)* Takagi, K. (U. Tokyo, Bunkyo-ku) and S. Okabe. *Jap. J. Pharmacol.* 18(1):9-18, 1968.

3201 **SURGICAL PHYSIOLOGICAL CONSIDERATIONS OF DUODENAL ULCERATION.** *(E.)* Scott, P. R. (Royal Melbourne Hosp., Australia). *Aust. New Zeal. J. Surg.* 37(4):371-372, 1968.

3202 **EXPERIENCES WITH THE SURGICAL MANAGEMENT OF BLEEDING PEPTIC ULCER IN SINGAPORE.** *(E.)* Ong, S. C. (U. Singapore) and N. K. Yong. *Aust. New Zeal. J. Surg.* 37(4):366-369, 1968.

3203 **A STUDY OF FIBRINOLYTIC ACTIVITIES IN PEPTIC ULCER WITH EXCESSIVE BLEEDING.** *(Jap.)* Iwahara, S. (Iwakuni Natl. Hosp., Yamaguchi, Japan), K. Mitsui, Y. Murashige and Y. Mizuno. *Iryo* 22(1):35-43, 1968.

3204 **MANAGEMENT OF PEPTIC ULCER.** *(E.)* Agarwal, J. R. (Sarvodaya Hosp., Bombay, India), S. D. Shah, S. S. Vaidya and S. G. Balani. *Indian Pract.* 21(4):227-231, 1968.

3205 **ANASTOMOTIC PEPTIC ULCER FOLLOWING ESOPHAGO-GASTROSTOMY, TREATED BY ROUX-EN-Y ESOPHAGO-JEJUNOSTOMY. [CASE REPORT]** *(Turk.)* Minkari, T. (Med. Fac. Istanbul U., Turkey) and M. Tanker. *Turk. Tip. Cem. Mec.* 34(1):64-72, 1968.

3206 **CONSIDERATIONS OF UPPER DIGESTIVE TRACT HEMORRHAGE DUE TO ULCERS.** *(Rum.)* Popovici, G. I. (United Hosp., Bacau, Rumania), A. Mocanu, G. G. Popovici and C. Asmarandei. *Rev. Medicochir. Iasi* 72(1):121-128, 1968.

3207 **TREATMENT OF PERFORATED PEPTIC ULCER (EXPERIENCE AT THE ESPANOL HOSPITAL).** *(Sp.)* Matute Vidal, A., C. Fernandez Cabal, A. Monroy, A. Olivares and C. Lavalle. *Cir. Cir.* 35(1):79-89, 1968.

3208 **TRIAL OF A NEW ANTACID COMPOUND IN GASTRITIS AND PEPTIC ULCER.** *(Sp.)* Garcia Herrera, E. (Jardin del Centenario No. 15, Coyoacan, Mexico City), J. Porras Ramirez and A. Villamil. *Med. Rev. Mex.* 48(1036):237-240, 1968.

3209 **PEPTIC ULCER OVER THE PAST ONE HUNDRED YEARS.** *(E.)* Pollard, H. M. and N. A. Augur Jr. *Practitioner* 201(1201):139-146, 1968.

3210 **PROGRESS IN THE TREATMENT OF DUODENAL ULCER.** *(Por.)* Paulino, F. *Hospital* 73(5):1359-1370, 1968.

3211 **VAGOTOMY ASSOCIATED WITH ANTRECTOMY.** *(E.)* Galvao, L. *Hospital* 73(5):1371-1386, 1968.

3212 **INDICATION OF SURGICAL TREATMENT OF GASTRIC ULCER.** *(Por.)* Hissa, A. and F. Paulino. *Hospital* 73(5):1421-1430, 1968.

3213 **PATHOLOGY OF GASTRIC ULCER.** *(Por.)* Roselli, A. and P. Fernando. *Hospital* 73(5):1431-1438, 1968.

3214 **TREATMENT OF GASTRIC AND DUODENAL ULCERS.** *(Por.)* Do Prado, F. C. *Hospital* 73(5):1439-1444, 1968.

3215 **THE DIFFERENTIAL DIAGNOSIS OF GASTRIC ULCERS.** *(Por.)* Prolia, J. C. *Hospital* 73(5):1491-1506, 1968.

3216 **OUR EXPERIENCE IN JUVENILE DUODENAL ULCER.** *(Sp.)* Guemes Diaz, F. ("Hermanos Aznar" Outpatient Clin., Madrid, Spain), V. M. de Marcos Perez, J. L. Galan Navarro, A. Perez Mota, I. Sanchez, G. Moreno, D. M. Roque Nelson and E. Arias Vallejo. *Rev. Esp. Enferm. Apar. Dig.* 27(5):725-740, 1968.

3217 **GASTRIC IRRADIATION IN THE TREATMENT OF PEPTIC ULCER.** *(E.)* Clayman, C. B. (Dept. Med., U. Chicago, Ill.), W. L. Palmer and J. B. Kirsner. *Gastroenterology* 55(3):403-407, 1968.

3218 **PYLORIC ULCERS.** *(Sp.)* De Arzua Zulaica, E. (Natl. Inst. Prophylaxis, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 27(5):741-760, 1968.

3219 **PEPTIC ULCER IN CENTRAL SCOTLAND.** *(E.)* Dunlop, J. M. (Stirling Royal Infirm., Scotland). *Scot. Med. J.* 13(6):192-201, 1968.

3220 **GASTRIC ULCER.** *(E.)* Gill, A. M. (West London Hosp., Hammersmith, England). *Brit. Med. J.* 3(5615):415-418, 1968.

3221 **SELECTIVE GASTRIC VAGOTOMY IN GASTRO-DUODENAL ULCER.** *(E.)* Berezov, Iu. Ie. (2d Pirogov Moscow Med. Inst., USSR), A. S. Iermolov and Z. N. Sanina. *Eksp. Khir. Anest.* (3):34-37, 1968.

3222 **GASTRODUODENAL ULCER: STATE-OF-THE-ART OF SURGICAL TREATMENT.** *(It.)* Grassi, G. (San Giovanni Hosp., Rome, Italy). *Clin. Europ.* 7(2):17[illegible]

3223 **POSTOPERATIVE PEPTIC ULCER: ETIOLOGICAL AND THERAPEUTIC ASPECTS OF 22 CASES.** *(Fr.)* Marchal, M., H. Baumel, G. Olivier, M. Balmes and M. Bousquet. *Montpellier Chir.* 13(6):853-866, 1967.

3224 **OUR EXPERIENCE IN THE SURGICAL TREATMENT OF DUODENAL ULCER.** *(Fr.)* Fontaine, R. (Surg. Clin., Strasbourg, France), S. Babin, B. L'Huillier, M. Lempert and P. Louis. *Gaz. Hop.* 140(6):159-160, 1968.

See also abstract nos.: 2705,2899,2909,3144

3225 ADENOCARCINOMA OF THE ILEUM COMPLICATING CHRONIC REGIONAL ENTERITIS. *(E.)* Morowitz, D. A. (Dept. Med. & Surg., U. Chicago, Ill.), G. E. Block and J. B. Kirsner. *Gastroenterology* 55(3):397-402, 1968.

3226 **ABSORPTION OF PHENOXYMETHYL PENICILLIN IN PATIENTS WITH STEATORRHEA.** *(E.)* Davis, A. E. (Prince Henry Hosp., Little Bay, Sydney, Australia) and R. C. Pirola. *Aust. Ann. Med.* 17(1): 63-65, 1968.

Serum levels of phenoxymethyl penicillin following oral administration of 500 mg of the drug were determined in 23 normal subjects, 3 patients with gluten-sensitive enteropathy, and 5 with steatorrhea from other causes. Blood samples were drawn 15, 30, 60, 120, and 150 min after oral administration; concentrations of the antibiotic (in μg/ml) were determined by the disc plate assay method by extrapolation from a standard curve. In the normal subjects, serum levels of penicillin peaked at 30 min and returned to near-base line levels by 150 min. Concentrations in the patients with gluten-sensitive enteropathy were considerably lower than in the normal subjects; the patients with steatorrhea from other causes had serum penicillin concentrations in the normal range. The low serum penicillin levels in the gluten-sensitive enteropathy patients may be a factor in the unresponsiveness of these patients to antibiotic therapy. Antibiotics should be given parenterally rather than orally in any but the mildest infections. Other drugs such as digitalis, barbiturates, and diuretics having lipid solubilities similar to that of phenoxymethyl penicillin may also be poorly absorbed in gluten-sensitive enteropathy.

3227 **BILE-SALTS IN SMALL INTESTINAL CONTENTS AFTER ILEAL RESECTION AND IN OTHER MALABSORPTION SYNDROMES.** *(E.)* McLeod, G. M. (Cent. Middlesex Hosp., London, England) and H. S. Wiggins. *Lancet* 1(7548):873-876, 1968.

Total bile-salt concentrations in small bowel contents after a test meal were measured in 9 normal subjects, 7 subjects with steatorrhea following ileal resection; 6 subjects with Crohn's disease; 1 subject with carcinoid tumor; and 8 subjects with steatorrhea from other causes. Stool fats, urinary xylase excretion, and vitamin A tolerance were determined. Quantitative analysis of bile salts was made by anion-exchange resin and chromatographic techniques. In normal subjects, virtually complete absorption was found at the lower ileal level. Upper small bowel concentrations of bile salts in the first 2 hr postprandium normally exceeds 4.0 mole/ml. The minimum concentration necessary for mixed micelle formation is 2.0 mole/ml. Six of the ileal-resected patients had subnormal bile-salt concentrations in the 2-hr postprandial period. Bile salt deficiency is probably not the sole mechanism of steatorrhea in these patients, since oral replacement does not abolish it completely. These findings suggest that the liver is unable to synthesize enough bile acids to compensate the excessive fecal loss. The general assumption that deoxycholate is absorbed from the colon is challenged by the absence of deoxycholate conjugates in 3 of the ileal-resected patients. The marked elevation of the glycine/taurine conjugate ratio in the ileal-resected patients suggests that glycine conjugates are more easily reabsorbed than taurine conjugates in these patients. This suggests that glycochenodeoxycholate or glycodeoxycholate would be the bile salt of choice for replacement therapy.

3228 **MILK INTOLERANCE FOLLOWING GASTRIC OPERATIONS WITH SPECIAL REFERENCE TO LACTASE DEFICIENCY.** *(E.)* Spencer, J. (Dept. Surg., Royal Postgrad. Med. Sch., London, England) and R. B. Welbourn. *Brit. J. Surg.* 55(4):261-264, 1968.

A survey of 100 gastric surgery patients revealed that 39% suffered from milk intolerance. Lactase assays in biopsies of small intestinal mucosa showed the highest concentrations of the enzyme in the jejunum and ileum, lower concentrations in the duodenum. Oral lactose tolerance tests in post-gastrectomy patients showed no difference in lactose absorption when compared with normal control subjects, even in the presence of milk intolerance. Absorption was similar regardless of the operative procedure (Polya or Billroth I). Lactose-barium meals in 20 post-gastrectomy patients showed no surgery-induced lactase deficiency. Lactase deficiency was found in 3 patients, but in them milk intolerance had preceded the operation by several years. In patients with known hypolactasia, milk causes abdominal colic and diarrhea, in contrast to the patients in this study, who usually complained of abdominal fullness and diarrhea. It is concluded that lactase deficiency does not play an important role in the milk intolerance seen following gastrectomy.

3229 **ABSORPTION OF L-METHIONINE FROM THE HUMAN SMALL INTESTINE.** *(E.)* Schedl, H. P. (Dept. Int. Med., State U. Iowa Coll. Med., Iowa City), C. E. Pierce, A. Rider and J. A. Clifton. *J. Clin. Invest.* 47(2):417-425, 1968.

Absorption of l-methionine from all levels of the small intestine was studied in normal and diseased human subjects by the technique of transintestinal intubation or by a steady-state perfusion technique. The 4 controls included 2 male and one female volunteer and a male ambulatory patient with generalized atherosclerosis. Three different concentrations of methionine were employed in each run. In the 4 normal subjects, absorption was higher in the proximal than in the distal intestine. In two patients with nontropical sprue studied during a period of relapse, there was a proximal zone of low absorption with higher absorption distally. As concentration was increased (range 3-100 mmoles/liter) methionine absorption showed rate-limiting kinetics. In normal subjects the proximal Michaelis constant was more than 3 times higher than distal, which suggests a difference in transport mechanisms between the two segments.

3230 **EVALUATION OF INTESTINAL ABSORPTION USING THE SCHILLING TEST (1).** *(Sp.)* Gutierrez, E. (Central U. Venezuela, Caracas), M. Rivero G., N. Arreaza C., R. Millan G., Raul Vera V. and R. de Prado. *G.E.N.* 22(1):73-78, 1967.

Results of the Schilling test carried out on 67 patients are analyzed with special reference to cases of intestinal malabsorption of vitamin B_{12}. Of 15 patients presenting with a primary intestinal malabsorption syndrome 11 (73.3%) had positive test results. Of 9 patients presenting with secondary malabsorption syndromes, 4 (44.4%) had positive results. Results were lower than normal in 5 cases of malabsorption syndrome due to intestinal resection. The Schilling test is easy and useful in diagnosing malabsorption, especially when this is due to ileal resection.

3231 SMALL-BOWEL CELL-LOSS AND WEIGHT-LOSS IN THE COELIAC SYNDROME. *(E.)*

Croft, D. N. (St. Thomas' Hosp., London, England), C. A. Loehry and B. Creamer. *Lancet* 2(7559):68-70, 1968.

In 11 patients (4 men and 7 women, 33-61-yr-old) with the celiac syndrome, the rate of accumulation of DNA in the small-intestinal lumen, which is interpreted as reflecting the rate of loss and turnover of small-intestinal epithelial cells, was determined by washing a segment of small intestine with isotonic saline. These patients had been observed for 4 months to 5 yr, and 6 of 11 had not shown the usual dramatic response to gluten withdrawal. In patients in clinical relapse associated with weight loss, the mean DNA loss rate was 39.8 mμg-atoms DNA-P/min, compared to a mean of 9.5 in patients in remission (steady body weight for 6-40 weeks) and to 8.4-17.3 (mean 12.0) in 7 controls. Patients in remission included 7 on a gluten-free diet (mean DNA loss rate of 10.2 mμg-atoms DNA-P/min) and one on a normal diet (DNA loss rate of 8.1). Patients in relapse included 3 on normal diets (loss rates of 20.6-71.8) and 2 on gluten-free diets (loss rates of 21.5-48.4). In 3 patients, initially high DNA loss rates fell to normal after induction of a remission with a gluten-free diet and/or prednisone. The association is thus between clinical response, as reflected by body weight loss, and small-intestinal DNA loss. Combined with the decreased small-intestinal absorptive area in the celiac syndrome due to the loss of villi, this high epithelial turnover may result in excessive loss of endogenous substances from the body. The term "exfoliative enteropathy" is suggested to describe this mechanism.

3232 STEATORRHEA INDUCED BY PARA-AMINOSALICYLIC ACID. *(E.)*

Levine, R. A. (Brooklyn-Cumberland Med. Ctr., New York). *Ann. Intern. Med.* 68(6):1265-1270, 1968.

Para-aminosalicylic acid (PAS) recrystallized with ascorbic acid (PAS-C) was administered orally (6 and 12g/day) to 7 healthy adult male volunteers fed a 100-g fat, gluten-free diet for 4 weeks to test PAS-C effects on intestinal absorption. Fecal fat, urinary D-xylose, carotene, and vitamin A values were determined weekly; blood levels of PAS, cholesterol, calcium, lipids, phosphorus, uric acid, total protein, free fatty acids and glucose; prothrombin time; and complete weekly blood counts were determined. Jejunal mucosa biopsies were obtained at the end of control, experimental and recovery periods. Similar studies were performed in 6 ambulatory pulmonary tuberculosis patients on regular hospital diet, and given 12 g of the acid equivalent of PAS sodium salt for 6 weeks to 4 months; the amount of sodium PAS given was equal to 6 g of PAS-C. Moderate steatorrhea without diarrhea was produced by 12 g/day of PAS-C in all subjects; 6 g/day did not induce fat malabsorption. Jejunal mucosal biopsies showed no drug-induced histological changes Among the tubercular patients, only 1 exhibited biochemical evidence of malabsorption and steatorrhea; no mucosal abnormalities were demonstrated. Although PAS-C in the usual recommended doses does not alter intestinal absorption, 12-g doses can be used to study reversible drug-induced malabsorption.

3233 INTESTINAL DIPEPTIDASES. DIPEPTIDASE ACTIVITIES IN SMALL INTESTINAL BIOPSY SPECIMENS FROM A CLINICAL MATERIAL. *(E.)*

Lindberg, T. (Dept. Med., U. Lund, Sweden), A. Norden and L. Josefsson. *Scand. J. Gastroent.* 3(2):177-182, 1968.

Nine different dipeptidase activities were studied in 22 patients with either diarrhea or abdominal discomfort; they were subdivided into 3 groups. Group I had 9 patients with histologically normal mucosa and normal fat excretion; Group II had 10 patients with histologically normal mucosa and idiopathic steatorrhea not improving on gluten-free diet; and Group III had patients with histologically abnormal mucosa and steatorrhea which improved with a gluten-free diet. Group I subjects showed expectantly higher values (25%) than previously reported from operative specimens, probably due to the more superficial biopsy technique. Comparable values were generally observed in Group II, with 3 patients having lower activity against some of the dipeptides. The patients with gluten-induced enteropathy (Group III) showed significantly lower values for all dipeptidases. Months after a gluten-free diet, when Group III subjects were re-biopsied, dipeptidase activities had increased, despite no morphological improvement of the mucosa. The results do not support the previously reported hypothesis that gluten-induced enteropathy is based on a lack of intestinal mucosal dipeptidase.

3234 STUDIES OF MALABSORPTION AND CALCIUM EXCRETION INDUCED BY NEOMYCIN SULFATE. *(E.)*

Gordon, S. J. (Upstate Med. Ctr., Syracuse, N. Y.), E. N. Haro, I. C. Paes and W. W. Faloon. *J.A.M.A.* 204(2):127-134, 1968.

The mechanisms whereby neomycin sulfate (12 g/day) induces reversible malabsorption were studied in 11 gastrointestinal disease-free obese subjects given formula diets containing 75 g fat, 100-1500 calories daily, and a constant amount of calcium, nitrogen, sodium, and potassium; neomycin was given orally, or introduced into the gastrointestinal tract by intubation. Fecal fat, calcium, nitrogen, sodium, and potassium were measured. Oral neomycin produced steatorrhea; when placed directly in the small intestine, fecal fat content decreased. When placed directly in the jejunum, neomycin increased fecal calcium more than when orally administered. There was a consistent decrease in fecal sodium with ileal neomycin administration; there was an increase in fecal nitrogen loss. Urinary calcium, sodium, and potassium decreased in 7 of 9, 8 of 11, and 7 of 9 subjects, resp., when neomycin was given orally. These effects were probably due to decreased intestinal absorption. Jejunal and ileal administration increased urinary calcium in 10 of 11 subjects, and urinary sodium and potassium in 9 of 11 and 10 of 11 subjects, resp. Malabsorption or steatorrhea were not corrected by sodium glycocholate, sodium taurocholate, or pancreatic extracts.

3235 FOLLOW-UP STUDY OF COELIAC DISEASE.

(E.) Mortimer, P. E. (Royal Postgrad. Med. Sch., London, England), J. S. Stewart, A. P. Norman and C. C. Booth. *Brit. Med. J.* 3(5609):7-9, 1968.

Biopsies of the proximal small intestine (Crosby capsule) revealed a flat jejunal mucosa with subtotal villous atrophy in 9 of 10 patients (2 men and 8 women, 23-40 yr old) in whom a diagnosis of celiac disease had been made in childhood (at 18-44 months of age in 9 and at 7 yr 10 months in 1). The childhood symptoms had lasted for 5-11.5 yr in 5 of 10, while in the other 5 they had never disappeared. None of these patients showed abnormal physical signs, but 3 had a hemoglobin below 10 g% and all 7 not receiving folic acid supplements had low serum folate levels (below 3 mμg/ml in 4 of 7). The serum vitamin B_{12} was normal in all 10 patients. Xylose absorption was normal in 2, moderately impaired in 3 and severely abnormal in 1. Moderate-severe symptoms of malabsorption (diarrhea, megaloblastic anemia) were noted in 5 of the 10 patients, but none were on a gluten-free diet (only 2 had ever been on a gluten-free diet, even in childhood). In the one case with a normal jejunal mucosa (32-yr-old man with a 5-yr history of childhood symptoms beginning at age 44 months), the original diagnosis is believed to have been incorrect.

3236 SMALL INTESTINAL SCLERODERMA WITH MALABSORPTION AND PNEUMATOSIS CYSTOIDES INTESTINALIS: REPORT OF THREE CASES.

(E.) Meihoff, W. E. (U. Colorado Med. Ctr., Denver), J. S. Hirschfield and F. Kern Jr. *J.A.M.A.* 204(10):854-858, 1968.

Case reports are presented for 3 female patients (39-57 yr old) with scleroderma of the small intestine manifested by chronic partial small bowel obstruction (abdominal pain, distension, alternating constipation and diarrhea) and pneumatosis cystoides intestinalis (air-filled cysts in the mesentery, serosal membranes and submucosa). Malabsorption of fat, vitamin B_{12} and xylose led to rapid wasting in all 3 cases, and in 2 rupture of the cysts led to pneumoperitoneum. One case was misdiagnosed as intestinal perforation and ileus, while in the other 2 (having massive jejunal contamination with bacteria due to stasis) the steatorrhea could be treated successfully with repeated courses of antibiotics (tetracycline and chloramphenicol). The first 2 patients (one with massive bacterial contamination and one originally misdiagnosed) died within 2-6 months of diagnosis, and the 3rd has shown rapid deterioration. Autopsy studies showed that the obstruction is due to the deposition of acellular fibrous connective tissue in the muscular and submucosal layers of the small intestine, especially the circular muscle layer. The lumen of the gastrointestinal tract seems to be the most likely origin of the cyst gas in these patients. It is concluded that pneumatosis cystoides intestinalis is probably a late complication of small intestinal scleroderma, the presence of which indicates a poor prognosis.

3237 FAMILIAL SELECTIVE MALABSORPTION OF VITAMIN B_{12}; A RE-EVALUATION OF AN *IN VIVO* INTRINSIC-FACTOR INHIBITOR.

(E.) Goldberg, L. S. (U. California Med. Ctr., San Francisco) and H. H. Fudenberg. *New England J. Med.* 279(8):405-407, 1968.

The cause of familial selective vitamin B_{12} malabsorption was studied in a 37-yr-old male patient who in previous studies was found to have intrinsic factor inhibitor and an antibody to intrinsic factor in his gastric juice. Recent bioassays of his gastric fluids showed normal intrinsic factor content and no evidence of intrinsic factor antibodies or inhibitor. The mechanism responsible for vitamin B_{12} malabsorption was not defined.

3238 DISACCHARIDASE ACTIVITY IN THE SMALL INTESTINE: PREVALENCE OF LACTASE DEFICIENCY IN 100 HEALTHY SUBJECTS.

(E.) Newcomer, A. D. (Mayo Clin., Rochester, Minn.) and D. B. McGill. *Gastroenterology* 53(6):881-889, 1967.

Lactase, sucrase and maltase activities were determined in specimens of jejunal mucosa taken by a Rubin biopsy tube from the ligament of Treitz in 100 healthy, fasting, Caucasian adults (50 men and 50 women, 20-63 yr old), none of whom had a history of milk intolerance (average milk consumption of 432 ml/day). As defined by a lactase activity below 0.6 U/g wet weight, along with normal sucrase and maltase activities, symptoms following ingestion of 50 g of lactose, and a flat blood sugar curve in the lactose tolerance test, 6 of these subjects (5 men and 1 woman, 21-58 yr old) were found to have isolated lactase deficiency, and 3 others had a lactase activity of 0.6-0.9 U/g. The sucrase:lactase ratio varied from 10.4 to infinity in these 6 subjects, compared to 0.5-4.3 in the other 94 cases, and the maltase:lactase ratio varied from 63 to infinity compared to 2.9-23.1; the maltase:sucrase ratio was 2.5-9.0 in the entire group of 100, and the two enzymes showed a correlation coefficient of 0.92. The correlation coefficients between lactase and sucrase and between lactase and maltase in the 94 normal subjects were 0.67 and 0.64, resp. Among the 6 subjects with lactase deficiency, 5 showed symptoms of intolerance after 1-4 glasses of milk, and all showed symptoms (diarrhea, cramping, bloating, borborygmi, or gas flatulence) after 50 g of lactose p.o.; symptoms began an average of 1.5 hr after ingestion of lactose and lasted an average of 3.75 hr. Similar symptoms were shown after 50 g of lactose by 2 of 57 normal subjects, but no symptoms were produced in any case by 25 g of glucose + 25 g of galactose. A maximal increase in blood sugar of less than 20 mg% in the lactose tolerance test was observed in all 6 deficient subjects (increases of 1-14 mg%) and in 8 of 33 normal subjects. None of the biopsy specimens showed any significant histological abnormalities, and serial studies showed only moderate variation in lactase activity over a 14-month period. There was no correlation between lactase activity and age, sex, milk intake, hours of fasting prior to biopsy, height, weight, or protein content of the mucosal specimen. In 2 normal subjects, loading with 150 g of lactose per day for 10 days had no effect on the jejunal lactase activity.

3239 CHANGES OF STRUCTURE AND ENZYME ACTIVITY IN MALABSORPTION DURING GASTROINTESTINAL PARESIS. *(E.)* Pőka, L. (U. Med. Sch., Pecs, Hungary), G. Czirbusz, E. Főldi, A. Farkas, J. Kerner and I. Bartek. *Digestion* 1(1):33-42, 1968.

Alterations in histological sections of small intestinal mucosa obtained from patients with postoperative paralytic ileus and from dogs 24-30 hr after gastric surgery were studied. Edematous loosening of the mucosa with loss of epithelial cell staining properties, disappearance of Paneth cells, and decreased mucin production in the area of the crypts was noted. The villous epithelial border was generally preserved. These findings were assumed due to a disturbance of epithelial regeneration. By histochemical means, a decrease in activity of alkaline phosphatase and adenosine triphosphatase in the epithelium and interstitium of the mucosa in the area of the crypts was found. Tissue hypoxia was thought to underlie the morphological and enzymatic alterations.

3240 MALABSORPTION OF IRON SECONDARY TO IRON DEFICIENCY. *(E.)* Kimber, C. (New England Med. Ctr. Hosps., Boston, Mass.) and L. R. Weintraub. *New England J. Med.* 279(9):453-459, 1968.

The effect of the iron-deficient state on intestinal iron absorption was studied in 8 children (8-25 months of age) with iron-deficiency anemia of predominantly dietary origin and 7 iron-deficient pure bred Harrier puppies, 21 days old at the start of the experiment; 5 healthy children (15 months-4 yr of age) and 8 normal dogs were used as controls. ^{59}Fe-labeled hemoglobin, produced in rabbits, was diluted to a dose concentration of 0.1 µC/0.5 mg of iron; 9 doses were given over a 3-day period to each child in 58 g of apple sauce. The dogs were fed standard diets containing 10 mg of iron per 100 g of diet or 0.09 mg per 100 g of diet for control and iron-deficient states, resp. Iron absorption was measured biweekly. Hemoglobin and inorganic iron absorption tests were performed in each animal. Plasma iron half-life and erythrocyte incorporation were measured after i.v. injection of 0.5 µC of ^{59}Fe per 0.5 µg of iron. The mean absorption of labeled hemoglobin by iron-deficient children was significantly less than the mean of the control group; reticulocytosis and elevated hemoglobin concentration promptly followed oral ferrous sulfate administration in 6 children. After anemia correction, absorption was improved in 4 of 5 patients tested. In the animal studies, mean labeled hemoglobin absorption in the iron-deficient group was significantly elevated in the third month of life; maximum iron absorption occurred at 5 months of age, when a significant fall in hematocrit and serum iron values was observed. Thereafter, iron absorption decreased and at 8 months was significantly less than controls. A significant increase in ^{59}Fe-ferrous sulfate absorption was noted at the fourth month and reached maximum in the fifth; a decrease occurred, but after 8 months, inorganic iron absorption in iron-deficient dogs was slightly greater than that of controls. Serum iron was less in deficient dogs, with plasma half-life more rapid, and ^{59}Fe erythrocyte incorporation increased at 5 days. Cytochrome oxidase and lactase activities were decreased in the intestinal mucosa of iron-deficient animals. It is concluded that a decrease in iron-containing or iron-dependent enzymes in the mucosa of deficient subjects may lead to abnormalities of cellular metabolism and secondary iron malabsorption.

3241 MALABSORPTION OF HEMOGLOBIN IRON IN PERNICIOUS ANEMIA: CORRECTION WITH INTRINSIC FACTOR-CONTAINING SUBSTANCES. *(E.)* Waxman, S. (Mt. Sinai Sch. Med., City U. New York, New York City), P. Pratt and V. Herbert. *J. Clin. Invest.* 47(8):1819-1825, 1968.

Iron absorption was studied in 5 patients with treated pernicious anemia (PA) with iron deficiency as well as in 2 normal and 2 iron deficient subjects. Hemoglobin iron absorption in the 5 patients with treated PA and iron deficiency was low compared to absorption in patients with iron deficiency alone. Hog intrinsic factor (IF) and normal neutralized depepsinized human gastric juice doubled hemoglobin iron absorption, whereas PA gastric juice did not enhance absorption in the patients with PA and iron deficiency. Absorption of heme iron also was enhanced by normal neutralized depepsinized gastric juice. No enhancement of hemoglobin iron absorption by these substances was found in the normal or iron deficient non-Pa control subjects. Incubation of hog IF with IF antisera significantly reduced the enhanced hemoglobin iron absorption seen with nonincubated hog IF. *In vitro* studies suggest a complex of heme with a substance present in IF-containing materials. Whether an intestinal transport factor for heme or whether normal gastric juice acts by another mechanism was not determined.

3242 REVERSAL OF FOLATE MALABSORPTION IN TROPICAL AND NONTROPICAL SPRUE BY CALF JEJUNUM. *(E.)* Baker, H. (New Jersey Coll. Med. Dent., East Orange), O. Frank, H. Ziffer, S. Feingold and A. A. Cintron-Rivera. *Brit. Med. J.* 3(5616):472-474, 1968.

In 2 patients with gluten enteropathy and 6 patients with tropical sprue, folic acid malabsorption was reversed only when a combination of 250 mg of lyophilized human jejunal juice or 5 g of lyophilized calf jejunum with 5 mg of synthetic folic acid was fed. Calf liver was ineffective. The factors in calf jejunum that reversed folic acid malabsorption were heat stable and did not form polyglutamyl folates on incubation with folic acid.

3243 SMALL INTESTINE GLUTAMINASE DEFICIENCY IN CELIAC DISEASE. *(E.)* Gelfand, M. D. (Yale U. Sch. Med., New Haven, Connecticut), H. M. Spiro and T. Herskovic. *Amer. J. Dig. Dis.* 13(7):638-642, 1968.

Glutaminase activity of the jejunal mucosa in 5 patients with celiac disease and in 12 control subjects was assayed. Enzymatic activity in the specimens from those patients with celiac disease was markedly diminished at the time the diagnosis was made, compared with glutaminase levels from control subjects. With treatment on a gluten-free diet, values returned to normal paralleling improvement in the histological appearance of the biopsy specimens. Patients with celiac disease whose symptoms persisted had biopsy specimens showing moderately severe mucosal damage, correlating with a maintenance of low enzyme values. Patients with abnormal biopsy specimens due to other small bowel diseases also had diminished enzyme activity. It is suggested that patients with untreated celiac disease have a secondary deficiency of glutaminase.

3244 LACTOSURIA IN THE AFRICAN WITH LACTASE DEFICIENCY.

(E.) Cook, G. C. (Royal Free Hosp., London, England) and G. R. Howells. *Amer. J. Dig. Dis.* 13(7):634-637, 1968.

This study was designed to develop a simple screening test for isolated lactase deficiency in African population groups, in view of this condition's high incidence in the Bantu tribes of Uganda (90% of the adult population) and its widespread incidence elsewhere. Three groups of subjects were studied. The first group consisted of 12 healthy adult Bantu volunteers from tribes whose members have a known high incidence of lactase deficiency in adult life and 10 Hamitic inpatients with no clinical evidence of malnutrition or gastrointestinal disease, from tribes whose members usually retain their lactase into adult life. The second group consisted of 9 children who had recovered from kwashiorkor at least 4 years previously; their jejunal biopsies were morphologically normal for the Ugandans, but were low in lactase activity. The third group consisted of 11 healthy adult European volunteers. After an overnight fast, lactose was administered orally in a dose of 50 g to the adults, and in a dose of 2 g/kg body weight to the children. Urine was collected over the next 5 hours. The specimens were tested for the presence of a reducing substance by the Clinitest method, and were also examined chromatographically for lactose. The results showed that 9 of the Bantu adults had colic and/or diarrhea and 2 of the children had diarrhea. None of the Hamitic or European subjects had any symptoms. Ten of the adult Bantu urine specimens contained between a trace and ½ mg/100 ml of reducing substance by the Clinitest method, and between 60-270 (mean 170) mg lactose by the chromatographic method. All of the children had trace to ½ mg/100 ml by Clinitest and 170-290 (mean 230) mg lactose by chromatography. One Hamitic patient had a trace of glucose, and 2 children and 1 European had a trace of galactose in the urine. The Clinitest method has given such clear-cut results as to be of value in detecting lactase deficiency in African populations, in whom symptoms of intolerance to lactose are unreliable criteria of diagnosis. A more sensitive form of Clinitest would be of value as a simpler screening test.

3245 EFFECT OF A NONLACTOSE DIET ON HUMAN INTESTINAL DISACCHARIDASE ACTIVITY.

(E.) Knudsen, K. B. (Scott & White Clinic, Temple, Tex.), J. D. Welsh, R. S. Kronenberg, J. E. Vanderveen and N. D. Heidelbaugh. *Amer. J. Dig. Dis.* 13(7):593-597, 1968.

The effect of 42 days of total lactose abstinence on intestinal enzyme activity and on oral lactose tolerance in 7 healthy Caucasian male volunteers without a history of milk intolerance was assessed. Following a control study period, the subjects consumed one of 2 special liquid diets as their only source of calories for 42 days. Both diets were analyzed daily for the complete absence of lactose. All subjects had biopsies taken from the area of the ligament of Treitz via a Crosby capsule during the control period and at the end of the diet study period; disaccharidase activities were determined by the method of Dahlqvist. Four subjects had lactose tolerance tests performed during the control period and at the end of the study. Blood glucose determinations were made in the fasting state and 30, 60 and 120 min after oral lactose (100 g). One subject was found to have an isolated lactase deficiency at the outset. None of the remaining subjects developed a lactase deficiency during the study. The intestinal lactase decreased in 3, increased in 2, and remained unchanged in 2 subjects. Other intestinal disaccharidases varied similarly, presumably due to the variability in the biopsy sites. Lactose tolerance tests showed no significant change in the maximum rise of blood sugar before and after the lactose deprivation period and no clinical symptoms of lactose intolerance was noted. Dietary lactose content does not appear to be an important factor in determining the level of intestinal lactase in humans over this period of time, nor would lactose deprivation be a factor in evaluating enzyme activity in small bowel biopsy specimens.

3246 STUDIES ON THE PATHOGENESIS OF MALABSORPTION: LIPID HYDROLYSIS AND MICELLE FORMATION IN THE INTESTINAL LUMEN.

(E.) Krone, C. L. (Cornell U. Med. Coll., New York, N. Y.), E. Theodor, M. H. Sleisenger and G. H. Jeffries. *Medicine* 47(2):89-106, 1968.

Abnormalities of lipid distribution in the intraluminal phase of lipid digestion were related to the mechanism of defective lipid absorption in studies on 2 normal subjects and 18 patients (11 men and 7 women, 24-70 yr old) with steatorrhea associated with extensive intestinal resection, bacterial overgrowth in the intestine, pancreatic insufficiency, total gastrectomy, Laennec's cirrhosis, and intestinal mucosal disease (regional enteritis, granulomatous enterocolitis). The diagnoses were determined by X-ray, jejunal biopsy, and studies of xylose and fat excretion and vitamin B_{12} absorption. After intubation of the proximal jejunum, each fasting patient received a test meal consisting of emulsified powdered skimmed milk and dextrose in corn oil, and analyses of the intestinal contents were performed at intervals to correlate the concentration of conjugated and unconjugated bile salts in the intestinal contents and the degree of lipolysis with the partition of dietary lipid between the oil and micellar phases and with the bacterial population of intestinal aspirates. These studies confirmed that fat incorporation into a micellar phase may be depressed either by a lowered concentration of conjugated bile salt (below the critical micellar concentration) or by impaired lipolysis. In patients with extensive intestinal resection without bacterial overgrowth, a decreased fraction of lipid in the micellar phase was associated with low levels of conjugated bile salt; this is consistent with interruption of the intrahepatic circulation of bile salt by distal resection of the intestine. Acid hypersecretion with a low jejunal pH was associated with reduced lipolysis in 2 of these patients. Unconjugated bile salts were identified in the jejunal contents of 5 patients; bacterial colony counts were above 10^5/ml in 4 of these patients, but the deconjugation of bile salt could not be attributed to a particular organism. Although one of these 4 showed a clinical and laboratory response to ampicillin (2 g/day), the other 3 did not respond to antibiotic therapy. A high intestinal concentration of unconjugated bile salt in one patient with a short gut was attributed to proximal absorption of unconjugated bile salt by passive nonionic diffusion. In 3 patients with pancreatic disease, there was defective lipolysis and a decrease in the incorporation of lipid into the micellar phase. No abnormalities were noted in 3 patients with Laennec's cirrhosis or in 2 patients with intestinal mucosal disease.

3247 **REDUCED ABSORPTION OF VITAMIN B_{12} IN TWO PATIENTS WITH FOLIC ACID DEFICIENCY.** *(E.)* Scott, R. B. (Med. Coll. Virginia, Richmond), R. B. Kammer, W. F. Burger and F. G. Middleton. *Ann. Int. Med.* 69(1):111-114, 1968.

3248 **PROXIMAL MUSCLE ATROPHY IN ADULT CELIAC DISEASE. [TWO CASES]** *(E.)* Hall, W. H. (U. Pennsylvania Hosp., Philadelphia). *Amer. J. Dig. Dis.* 13(8):697-704, 1968.

3249 **SYSTEMIC SCLEROSIS. CASE PRESENTING WITH TETRACYCLINE-RESPONSIVE MALABSORPTION SYNDROME.** *(E.)* Alpert, L. I. (Mt. Sinai Hosp., New York City) and R. R. P. Warner. *Amer. J. Med.* 45:468-473, 1968.

3250 **JEJUNAL CRYPT CELL AND MARROW MORPHOLOGY IN TROPICAL SPRUE.** *(E.)* Wheby, M. S. (Dept. Med., U. Virginia Sch. Med., Charlottesville), V. Swanson and T. M. Bayless. *Ann. Int. Med.* 69(3): 427-434, 1968.

See also abstract nos.: 2748

LARGE INTESTINE

3251 **NONSPECIFIC (ISCHAEMIC) SEGMENTAL COLITIS.** *(E.)* Sturdy, D. E. (Royal Gwent Hosp., Newport, Monmouthshire, England). *Brit. J. Surg.* 55(2):99-101, 1968.

Six cases are reviewed and a seventh case report presented of nonspecific ischemic segmental colitis. All cases presented with acute onset of symptoms involving a short segment of the left colon, the rest of the large and small intestines remaining normal. Symptoms included increasing constipation, colicky abdominal pains, weight loss, and eventual rectal bleeding in most cases. A clinical diagnosis of colonic neoplasm, supported by radiological findings, is usually made. If the patient's condition is satisfactory, end-to-end colonic anastomosis is the procedure of choice provided that the lesion is identified as benign during surgery. No postoperative complications have occurred. The etiology is unknown; the most likely is a gradual vascular occlusion, particularly of the left colonic and sigmoid vessels, either due to trauma, embolism, or a localized periarteritis with subsequent ischemia and fibrosis of the affected bowel segment. This condition is in no way related to Crohn's disease or ulcerative colitis.

3252 **RESECTION OF HINDGUT FOR IDIOPATHIC MEGACOLON IN ADOLESCENCE.** *(E.)* Roy, A. D. (Western Infirm., Glasgow, Scotland). *Brit. J. Surg.* 55(2):106-109, 1968.

Bowel function, psychogenic factors, and radiological appearances were analyzed in 5 male patients aged 12-18 yr before and after colon surgery. Before surgery, all 5 patients suffered from incontinence, fecal soiling, and abdominal distention; 3 patients had these symptoms from birth and 2 had acquired them after apparently normal function to the age of 3 and 4½ yr. Age of onset was the only apparent difference in the 5 cases. In 4 cases, the conditions had been considered psychogenic by the clinicians treating them. Radiologically, all cases showed gross dilation of the rectum and sigmoid colon; the latter was long and redundant, and the right colon was of normal caliber in all cases. No narrowed bowel segments were seen in any of the cases. One patient had a bladder diverticulum and one a dilated bladder; all had normal upper urinary tracts. Each patient underwent surgical resection from the mid-transverse colon to the lower rectum, leaving a rectal stump of 4-7 cm. The anal sphincter was dilated. All surgical specimens showed marked rectal dilation with massive muscular hypertrophy. Nervous plexuses and ganglion cells were completely normal, and no aganglionic segments were found. Follow-up from 9 months to 2 years reveals extremely satisfactory surgical results with normal passage of feces. Three patients still show some delay in emptying the colon. Sphincter function has been normal in all cases. Behavioral patterns have been normal in all cases since surgery. The poor results previously reported for this type of case may have been because resection was limited to the dilated rectum and sigmoid colon, instead of including the entire hindgut as reported here. The psychological upset often noted in this type of patient is thought to be a result, rather than the cause, of the symptoms. The completeness of the surgical cure achieved in these 5 cases would be surprising if the condition were psychogenic.

3253 **LOCALIZED GIANT PSEUDOPOLYPS OF THE COLON.** *(E.)* Hinrichs, H. R. (Beth Israel Hosp., Boston, Mass.), and H. Goldman. *JAMA* 205(4):108-109, 1968.

The case history of a 55-yr-old man with recurrent giant pseudopolyps of the colon in association with localized ulcerative colitis is presented. A 5-day history of bright red rectal bleeding prompted hospitalization in 1963. The admission physical revealed no abnormality. Sigmoidoscopy revealed friable, ulcerated mucosa above a depth of 19 cm. Barium enema revealed diffuse ulcerative colitis of the descending and sigmoid colon and an irregular constricting lesion of the splenic flexure consistent with an annular carcinoma. A partial colectomy of the distal transverse and descending colon and an end-to-end anastomosis were performed. The resected specimen contained an annular, villose, nodular lesion measuring 15 cm in length and 2 cm in height. Histological examination revealed a localized area of marked pseudopolyp formation without carcinoma or other neoplastic changes. The colon on either side of the mass was diffusely involved with active, idiopathic, ulcerative colitis including scattered small foci of pseudopolyp formation. In 1965, barium enema revealed a moderate recurrence of polyp formation in the region of the anastomosis. In 1967, an episode of bright red rectal bleeding prompted a barium enema which revealed a marked increase in size of the polypoid lesion seen in 1965. On admission at this time, physical examination was normal and sigmoidoscopy revealed normal mucosa to a depth of 25 cm. Repeat barium enema showed a large villose mass in the transverse colon. Fluoroscopy revealed numerous, long, highly mobile mucosal fronds. A partial colectomy was again performed from the proximal transverse to the sigmoid colon. The resected specimen contained a 10 cm long circumferential lesion composed of numerous interconnecting villi up to 6 cm in height. The previous anastomotic site indentified in the center of the lesion. Histologically, the lesion consisted of anastomosing bands of epithelial-lined fibrovascular connective tissue projecting from, but limited to, the mucosa. The overlying epithelium consisted of normal or hyperplastic colonic cells without evidence of neoplastic transformation. There was associated, nonspecific, acute and chronic inflammation in the mucosa and superficial submucosa without ulceration. The excised margins of the lesion were free of disease. There was no evidence of Crohn's disease. The isolated occurrence of localized, giant pseudopolyps of the colon is an uncommon phenomena; only 3 other cases having been reported in the literature over the past 10 years.

3254 **ADENOCARCINOMA, ADENOMAS AND POLYPS OF THE COLON: HISTOCHEMICAL STUDY.** *(E.)* Czernobilsky, B. (U. Pennsylvania Hosp., Philadelphia) and K. C. Tsou. *Cancer* 21(2):165-177, 1968.

Comparative histochemical studies of acid and alkaline phosphatase, esterase, ATPase and succinic dehydrogenase in surgical specimens from 82 patients with inflammatory, adenomatous, hyperplastic and retention polyps, adenocarcinoma, and villous adenoma of the large intestine revealed significant enzymatic differences between the various lesions. No alkaline phosphatase could be detected in any of these tissues, and all the lesions except inflammatory and retention polyps (which were histochemically indistinguishable from normal colonic mucosa) showed decreases in acid phosphatase, esterase, and ATPase. On the basis of the succinic dehydrogenase levels, the other lesions could be classified into 3 main groups: 1) adenomatous polyps, with increased succinic dehydrogenase; 2) adenocarcinoma, with generally decreased succinic dehydrogenase but focal intense activity; and 3) villous adenomas, atypical areas in adenomatous polyps ("carcinoma in situ"), and hyperplastic polyps, with uniformly decreased succinic dehydrogenase. The significance of the enzymatic similarity between hyperplastic polyps and the potentially invasive colonic lesions requires further investigation.

3255 **ISCHEMIC PROCTITIS.** *(E.)* Kirkpatrick, Z. M. (Yale U. Sch. Med., New Haven, Connecticut), J. Farman, R. Yesner and H. Spiro. *J.A.M.A.* 205(2):74-80, 1968.

Spontaneous bowel ischemia leading to clinically and radiologically recognizable rectum disease was observed in 10 patients, 62-86 yr of age, 7 of whom showed clinical evidence of arteriosclerosis. Pain, alteration in bowel function or rectal bleeding were the usual symptoms; constipation occurred in 3 patients and diarrhea, in 3 others. Two patients had no symptoms attributable to rectal disease. Sigmoidoscopic examinations were performed in all but one patient. Abnormal rectal mucosa, with edema, friability, and ulcerations was observed. Histological examinations of biopsy specimens revealed mucosal infarction in 4 patients and mucosal ulceration in the remaining 6. Roentgenographic findings revealed mucosal edema ulceration, diminished distensibility, thumb print filling defects, and stricture formation. Mucosal abnormalities healed without specific treatment in several patients. A decrease in symptoms was noted in 3 patients given steroid (22 mg) enemas once or twice daily; the exact role of steroids in healing was not defined, since some ischemic lesions are transient and reversible.

3256 **RECTAL BLEEDING WITH SPECIAL REFERENCE TO CANCER OF THE LARGE INTESTINE.** *(E.)* Aylett, S. O. (Gordon Hosp., London, England). *Brit. Med. J.* 3:103-106, 1968.

In a consecutive series of 100 cases of rectal and 100 cases of colonic cancer, the average patient-caused delay (between appearance of symptoms and first visit to the doctor) was 10.3 and 7 months, resp., while the average medical delay (between that visit and a correct diagnosis) was another 10.3 months and 7.8 months, resp.; a significant medical delay occurred in 22% of the cases in each group, and 25% and 67% of this delay, resp., took place in the hospital. These delays have not decreased significantly in the past 16 yr, despite advances in medical knowledge and public awareness, due to overreadiness to ascribe rectal bleeding to hemorrhoids, particularly in younger patients. Among the 78 patients with rectal cancer and 78 with colonic cancer who were treated without any medical delay, 16 and 17, resp., were still in stage A (tumors confined to the bowel wall), compared to only 4 out of 44 patients with the same tumors treated after a delay. Stage C tumors, on the other hand, were found in 25-30% of patients treated without delay and 50-64% of those in whom there were delays. In view of the disastrous effect of medical delay on patient prognosis, the author outlines a procedure for differentiating rectal bleeding due to cancer from that due to other causes. The procedure includes a detailed questioning of the patient as to the nature and characteristics of the bleeding, alterations in bowel habits, and other associated symptoms, plus a careful general examination of the patient followed, if necessary, by special studies such as sigmoidoscopy, barium enema, and eventually laparotomy.

3257 **THE RADIOLOGY OF ISCHEMIC PROCTITIS.** *(E.)* Farman, J. (Yale U. Sch. Med., New Haven, Conn.), E. Betancourt and Z. Kilpatrick. *Radiology* 91(2): 302-307, 1968.

Sidmoidoscopy, barium enema examination, and rectal biopsy were performed in 9 elderly patients (62-74 yr of age) who complained of acute abdominal pain, rectal bleeding, and alteration in bowel function; 6 patients had evidence of arteriosclerotic vascular disease. Radiological studies revealed "thumb printing" filling defects characteristic of colonic ischemia. Further examination revealed rectum and sigmoid mucosal ulcerations; friable, hypertrophic "cobblestone" mucosa; and diminished distensibility. Arteriography showed aortic and other vascular calcification. Palpable abdominal masses, later identified as aneurysms were present in 2 patients. Biopsy revealed only mucosal and submucosal ulceration and infarction; 1 patient showed occasional submucosal macrophages. Sigmoid changes were evident in all cases of rectal involvement. Later sigmoidoscopic examination showed evidence of mucosal healing and improvement in distensibility. Ulceration, "thumb printing," and changes in appearance on barium examination over a short period aid the radiologist in differentiating colonic ischemia and ulcerative colitis.

3258 **A STUDY OF THE MOTILITY IN DIFFERENT PARTS OF THE HUMAN COLON.** *(E.)* Kock, N. G. (Dept. Surg., U. Goteborg, Sweden), L. Hulten and L. Leandoer. *Scand. J. Gastroent.* 3(2):163-169, 1968.

Motility pressure studies were performed on the ascending and transverse colon and the sigmoid during rest, after food ingestion, and after i.v. prostigmine (0.5 mg) injection in 12 hr fasted appendectomy patients (26-67 yr of age). Planimetry was used to determine the areas of the pressure waves to define colonic motility. The resting activity in each part of the colon was independent of the other parts and varied in the same individual from day to day. Activity increased in all areas after eating and prostigmine administration, especially in the sigmoid. The prostigmine response exceeded that of food ingestion and resulted in a strong urge to defecate.

3259 **PREOPERATIVE IRRADIATION FOR CANCER OF THE RECTUM AND RECTOSIGMOID:**

PRELIMINARY REVIEW OF RECENT EXPERIENCE (1957-1962). *(E.)* Stearns, M. W. (Memorial Hosp. Cancer & Allied Dis., New York City), M. R. Deddish and Quan, S. H. Q. *Dis. Colon Rectum* 11(4):281-284, 1968.

A recent five-year study on rectal cancer patient treatment and survival was compared to a previous five-year study. The five-year survival rate was higher in patients in the current series than the previous one. The survival rate of patients undergoing irradiation prior to resection, remained constant while that of patients surgically treated was significantly higher in the current series; this improvement was noted in lymph node metastasis patients and is attributed to new more effective surgical techniques now available. Preoperatively irradiation contributes very little to improved survival rates in the current study.

3260 **VILLOUS ADENOMAS OF THE COLON COMPLICATED BY ELECTROLYTE IMBALANCE.** *(E.)* Deysine, M. (St. Raphael's Hosp., New Haven, Conn.). *Dis. Colon Rectum* 11(4):289-291, 1968.

Villous colon adenomas were found during rectal examination in 3 female patients, 70-87 yr of age; accompanying this condition were dehydration and electrolyte imbalance secondary to loss of mucus. Cardiovascular complications limited fluid and electrolyte replacement in 2 patients who subsequently died. The adenomas were soft, shaggy, and broad-based; they secreted large amounts of mucus and showed foci of malignant degeneration. The amount of discharge is directly related to the degree of electrolyte imbalance. It is suggested that in this condition aldosterone secretion may be elevated to compensate for sodium losses, and body sulfur depleted due to the loss of mucoitin sulfuric acid in the mucus.

3261 **EMERGENCY RESECTION IN TREATMENT OF DIVERTICULAR DISEASE OF COLON COMPLICATED BY PERITONITIS.** *(E.)* Roxburgh, R. A. (Middlesex Hosp., London, England), J. L. Dawson and R. Yeo. *Brit. Med. J.* 3(5616):465-466, 1968.

Of 25 consecutive patients with spreading peritonitis due to diverticular disease, 22 had purulent peritonitis and 3 had gross fecal peritonitis. Primary end-to-end anastomoses was performed in 8 patients, a Paul-Mikulicz excision in 8 patients, a Hartmann's procedure in 8 patients, and a simple exteriorization in 1 patient whose condition precluded any form of resection. The 22 patients with purulent peritonitis survived, with continuity being restored in 19. The 3 patients with fecal peritonitis died; 1 had a Hartmann's procedure, 1 had a primary anastomoses, and the other had a simple exteriorization. No anastomotic leaks developed and no complications arose. The average hospital stay of the survivors was 25 days.

3262 **CARCINOMA OF THE TRANSVERSE COLON AND THE SPLENIC FLEXURE.** *(E.)* Bacon, H. E. (Temple U. Hosp., Philadelphia, Pa.) and A. R. Gennaro. *Surg. Gynec. Obstet.* 127(3):523-527, 1968.

Of 40 patients with carcinoma of the transverse colon (17 patients) or splenic flexure (23 patients), a peak incidence was noted in the 7th decade without any significant sex predominance. Rectal bleeding occurred in 55%, increasing constipation in 47.5%, and weight loss in 27.5% of patients. A palpable upper abdominal mass was present in 32.5% of patients. Physical examination failed to reveal any abnormality related to the colonic carcinoma in 35% of patients. Sigmoidoscopy revealed a synchronous carcinoma of the rectum or rectosigmoid in 4 females (10%). Barium enema examination demonstrated the carcinoma on first examination in 95% of patients. The carcinoma was resectable in 37 patients (93%). The operative mortality was 2.7%. The overall 5-year survival rate was 48.6%. Fourteen patients were assigned Duke's A classification, 10 patients Duke's B classification, and 16 patients Duke's C_1 and C_2 classification. The comparative 5-year survival rates were 64.3%, 50%, and 25% resp. The corrected 5-year survival rate for curative resections in patients with positive nodes was 40%. Of 13 patients with annular lesions, 5 (38.4%) survived for more than 5 years; of 24 patients with nonannular carcinomas, 13 (54.2%) survived for more than 5 years. The overall outlook for this particular carcinoma is as favorable as for any other colonic carcinoma.

3263 **ACUTE AND DELAYED COLON ISCHEMIA AFTER AORTIC ANEURYSM SURGERY.** *(E.)* Bicks, R. O. (U. Tennessee Coll. Med., Memphis), G. F. Bale, H. Howard and R. F. McBurney. *Arch. Intern. Med.* 122(3):249-253, 1968.

Following surgery for abdominal aortic aneurysm in 19 patients, 2 distinct clinical syndromes of colon ischemia were noted. In group I, 13 patients developed bloody diarrhea within 72 hours postoperatively: 9 died from acute gangrene of the colon; 2 survived with emergency hemicolectomies; and 2 survived with intact colons. The cause of the gangrene was either postoperative arterial insufficiency or venous thrombosis. Prophylactic antibiotic bowel sterilization prior to surgery did not prevent gangrene. In group II, 6 patients developed loose, watery, blood-containing stools 5 to 7 days postoperatively. Rectal biopsies revealed fibrin thrombi in arterioles in all patients. Proctology revealed normal to ulcerative colitis-like findings. In 5 patients, barium enema revealed mucosal spasm and edema in the area of the splenic flexure. These changes reverted to normal within 2 to 3 months. All patients in group II survived and were ultimately free of bowel complaints.

3264 **A CRITICAL REAPPRAISAL OF SIGMOID PERIDIVERTICULITIS.** *(E.)* Berman, L. G. (Upstate Med. Ctr., State U. New York, Syracuse), D. Burdick, E. R. Heitzman and J. T. Prior. *Surg. Gynec. Obstet.* 127(3):481-491, 1968.

In the histological study of 54 surgical specimens removed for sigmoid peridiverticulitis, the inflammatory disease in most instances was confined to the pericolic fat with little or no demonstrable disease of the colon. The diverticular lining usually disclosed a totally intact mucosal lining. Small lymphoid aggregates were often noted within the fibromuscular tissue at the base of the diverticulum. Radiological examination of the surgical specimens with barium *in vitro* suggested that radiological evaluation of the disease should be limited to the changes secondary to the perforation of a single diverticulum into the wall of the intestine or into the pericolic soft tissue. Although surgical management for the complications of the disease is well established, elective or prophylactic resection for recurrent or persistent disease is rarely indicated, since in most instances, peridiverticulitis is the result of the perforation of a single diverticulum and does not represent disease of the intestine *per se.*

3265 **SYSTEMATIC RECTAL BIOPSY. (PRELIMINARY REPORT).** *(Sp.)* Fuenmayor Fonseca, A. (Maracaibo, Venezuela), L. E. Alezard, M. Henriquez and C. Solarte. *G.E.N.* 22(1):53-66, 1967.

Data are given on the age, sex, clinical history, physical and laboratory examinations, and endoscopic and radiological findings for 96 patients undergoing rectal biopsy. Chronic inflammation was found in 63.44% of the cases biopsied; microhemorrhage of the lamina propria and vasodilatation in 5.76%; ulcerative rectocolitis, edema of the lamina propria, microhematomas of the mucosa with increase of the basal membrane, microhemorrhage of the mucosa, and rectitis with microulcers in 3.84%. Radiology of the colon and endoscopy are very useful, but conclusive diagnosis based exclusively on clinical data is difficult. The following symptoms are stressed: abdominal pain and diarrhea are not usually accompanied by microscopic lesions; constipation is frequent in neurosis, and constipation may be psychogenic; ulcerative rectocolitis can only be diagnosed by rectal biopsy.

3266 **MECONIUM PLUG SYNDROME: A CAUSE OF NEONATAL INTESTINAL OBSTRUCTION.** *(E.)* Swischuk, L. E. (U. Okla. Med. Ctr., Oklahoma City). *Amer. J. Roentgenol.* 103(2):339-346, 1968.

3267 **PERFORATED APPENDICITIS: A 30-YEAR REVIEW AT THE SWEDISH HOSPITAL MEDICAL CENTER.** *(E.)* Hoffman, H. C. (Swedish Hosp. Med. Ctr., Seattle, Wash.). *Amer. Surg.* 34(7):534-537, 1968.

3268 **TREATMENT OF VOLVULUS OF THE SIGMOID.** *(Rus.)* Ibadov, I. Iu. (Andizhansk Med. Inst.). *Med. Zhur. Uzbek* (4):60-62, 1968.

3269 **COMPLEX X-RAY DIAGNOSIS OF TUMORS OF THE LARGE INTESTINE.** *(Rus.)* Rykhsiev, Kh. (Uzbek Sci. Res. Inst. Roentgenol., Radiol. & Oncol., Tashkent, USSR). *Med. Zhur. Uzbek* (4):19-22, 1968.

3270 **CLINICAL EXPERIENCE, DIAGNOSIS, AND TREATMENT OF CANCER OF THE RIGHT-SIDE COLON: BASED ON MATERIALS FROM THE UZBEK REPUBLIC CANCER CLINIC.** *(Rus.)* Kamilov, Kh. K. (Tashkent Inst. Postgrad. Med. Studies, USSR). *Med. Zhur. Uzbek* (4):23-25, 1968.

3271 **ACUTE NECROTIZING ENTEROCOLITIS: SURVIVAL FOLLOWING PERFORATION AND RESECTION IN TWO POSTOPERATIVE PATIENTS.** *(E.)* Tanner, N. C. (St. James Hosp., Balham, England) and K. J. Hardy. *Brit. J. Surg.* 55(5):379-381, 1968.

3272 **CARCINOMA OF THE CAECUM AND COLON.** *(E.)* Ellis, H. (Westminster Hosp., London, England). *Brit. Med. J.* 3(5609):37-39, 1968.

3273 **THE LARGE INTESTINE AS A GERIATRIC PROBLEM.** *(E.)* Strode, J. E. (Straub Clinic, Honolulu, Hawaii). *Geriatrics* 23(7):102-112, 1968.

3274 **SOLITARY GIANT DIVERTICULUM OF THE SIGMOID COLON.** *(E.)* Piper, J. V. (New End Hosp., Hampstead, England) and B. A. Thornley. *Brit. J. Surg.* 55(5):398-400, 1968.

3275 **NECROTIZING COLITIS IN PATIENTS UNDERGOING LONG-TERM TREATMENT WITH PHENOTHIAZINE DERIVATES.** *(E.)* De Boer, H. H. M. (St. Franciscus Gasthuis, Rotterdam) and J. A. M. Van Unnink. *Arch. Chir. Neerl.* 22(11):163-171, 1968.

3276 **CONSIDERATIONS ON CANCER OF THE SIGMOID COLON AND RECTUM.** *(Sp.)* Garriz, R. A. (Francisco T. Olivera Inst. Gastroent. & Nutr., Rawson Hosp., Buenos Aires, Argentina) and D. Stescobich. *Prensa Med. Argent.* 55(11):505-507, 1968.

3277 **CONSIDERATIONS ON DIVERTICULA OF THE COLON IN ELDERLY PATIENTS.** *(Rev.)(It.)* Mars, G. (Trivulzio Clin., Milan, Italy), A. Buogo, G. Kauchtschischvili, G. Nebuloni, A. Necchi della Silva, E. Turolla and W. Zonolla. *G. Geront.* 15(10):1243-1266, 1967.

3278 **PERFORATION OF THE RECTUM DURING ROENTGENOGRAPHY OF THE COLON WITH BARIUM ENEMA. [FOUR CASES]** *(Dut.)* De Boer, H. H. M. (Zuider Hosp., Rotterdam, Netherlands) and B. Speyer. *Nederl. T. Geneesk.* 112(22):1026-1029, 1968.

3279 **SEGMENTAL (GRANULOMATOUS) DISEASE OF THE COLON.** *(E.)* Crohn, B. B. (Dept. Med., Mt. Sinai Hosp., New York City). *Israel J. Med. Sci.* 4(1):146-148, 1968.

3280 **THE EVOLUTION OF COLOSTOMY. PART I. THE DAYS BEFORE COLOSTOMY.** *(E.)* Cromar, C. L. L. (Pasadena, Texas). *Dis. Colon Rectum* 11(4):256-280, 1968.

3281 **LEIOMYOSARCOMA OF THE COLON—A REVISED PROGNOSIS: REPORT OF A CASE.** *(E.)* LeMole, G. (Temple U. Health Sci. Ctr., Philadelphia, Pa.), L. I. Goldman and G. P. Rosemond. *Dis. Colon Rectum* 11(4):306-310, 1968.

3282 **PRIMARY SIDE-TO-SIDE COLORECTAL ANASTOMOSIS IN THE DUHAMEL OPERATION FOR HIRSCHSPRUNG'S DISEASE.** *(E.)* Steichen, F. M. (Dept. Surg., Albert Einstein Coll. Med., Ill.), J. L. Talbert and M. M. Ravitch. *Surgery* 64(2):475-483, 1968.

3283 **FATAL COMPLICATIONS OF DIVERTICULOSIS OF THE COLON.** *(Ger.)* Kuhn, H. (St. George Hosp., Leipzig, Germany) and H. Bellman. *Zbl. Chir.* 93(22):778-782, 1968.

3284 **TOPIC USE IN PROCTOLOGY OF A NEW PRODUCT WITH CAUSTIC-ASTRINGENT ACTION.** *(Por.)* Pontes, J. T. *Hospital* 73(5):1599-1604, 1968.

3285 **ON THE ANO-RECTAL ORGAN OF CONTINENCE.** *(E.)* Stelzner, F. (U. Clin. Polyclin., Hamburg, Germany). *Amer. J. Proctol.* 19(4):264-268, 1968.

3286 **DIVERTICULAR DISEASE OF THE COLON.** *(E.)* Painter, N. S. (The Manor House Hosp., London, England). *Brit. Med. J.* 3(5616):475-479, 1968.

3287 **TOXIC DILATATION OF THE COLON COMPLICATING PSEUDOMEMBRANOUS ENTEROCOLITIS.** *(E.)* Brown, C. H. (Ochsner Clinic, New Orleans, La.), W. A. Ferrante and W. D. Davis Jr. *Amer. J. Dig. Dis.* 13(9):813-821, 1968.

3288 **CLINICAL AND LABORATORY CHARACTERISTICS OF ENTERIC COLI-INFECTIONS CAUSED IN CHILDREN BY SEROTYPE 0-124.** *(Rus.)* Shuklina, M. L. (Moscow, USSR), G. F. Ivanova and L. Kh. Zav'ialova. *Vop. Okhr. Materin. Dets.* (7):61-64, 1968.

3289 **STATE-OF-THE-ART IN THE SURGICAL TREATMENT OF CONGENITAL AND ACQUIRED MEGACOLON.** *(Por.)* Haddad, J. (U. Hosp., Sao Paulo, Brazil). *Rev. Hosp. Clin. Fac. Med. S. Paulo* 23(2): 101-115, 1968.

3290 **ANATOMICAL AND PATHOLOGICAL DIAGNOSIS OF CROHN'S DISEASE OF THE COLON.** *(Fr.)* Martin, E. D. (Bichat Hosp., Paris, France) and J. Delarue. *Mem. Acad. Chir.* 94(6/7):217-224, 1968.

3291 **PERFORATION OF THE CECUM BY A FOREIGN BODY SIMULATING APPENDICITIS.** *(Ger.)* Schroder, K. (Stollberg/Erzegebirge Dist. Hosp., Germany). *Zbl. Chir.* 93(17):626-630, 1968.

3292 **REPEATED COLON RESECTION IN PRIMARY CARCINOMA.** *(Ger.)* Baumgartl, E. (Surg. Clin., National Health Svc., Salzburg, Germany) and H. Steiner. *Krebsarzt* 23(1):21-24, 1968.

3293 **PRESENT STATE OF RECTAL CANCER TREATMENT.** *(Fl.)* Ceulemans, G. (Antwerp, Belgium). *T. Gastroent.* 11(1):61-66, 1968.

3294 **THE RESPONSE TO PSYCHOTHERAPY IN CHRONIC ULCERATIVE COLITIS. I. PRETREATMENT FACTORS.** *(E.)* Karush, A. (Dept. Psych., Coll. P & S, Columbia U., New York City), G. E. Daniels, J. F. O'Connor and L. O. Stern. *Psychosom. Med.* 30(3):255-276, 1968.

Various pretreatment factors in 30 patients with ulcerative colitis were compared with the results of psychotherapy. Somatic and psychological evaluations were made 1-11 yr after the conclusion of psychotherapy. Schizophrenia nearly doubled the probability of a poor prognosis for ulcerative colitis. Precipitating stress was found to be more common in nonpsychotic patients. All patients showed a significant degree of regression, although there were no defenses which were characteristic of ulcerative colitis. Loss of control was associated with chronic hostility and anxiety. Where there was secondary gain from the illness, it perpetuated the ulcerative colitis and worsened the prognosis. Strong symbiotic needs and passive helplessness indicated a poorer prognosis than in those patients who tried to remain active and relatively independent. Severe ego impairment led to a poor prognosis, but ego weakness did not prevent somatic improvement. Complete remissions of ulcerative colitis for as long as 11 yr were noted in patients beginning treatment with greater ego strength.

3295 **THE ASSOCIATION OF ERYTHEMA NODOSUM WITH ULCERATIVE COLITIS.** *(E.)* Sams, W. M. Jr. (Mayo Clin., Rochester, Minn.) and R. K. Winkelmann. *Southern Med. J.* 61(7):676-679, 1968.

Among 518 patients (104 males and 414 females, 4-67 yr old at onset, average 40 yr) with erythema nodosum diagnosed during the period 1935-50, 14 (2 males and 12 females, 11-63 yr old, average 28 yr) had chronic ulcerative colitis, and in 12 of 14 the colitis was most probably the cause of the erythema. In 2 of 3 patients with recurrent erythema nodosum, the recurrence appeared during a flare-up of ulcerative colitis, and in 8 without recurrences the colitis was either healed or under control. Among 679 similar patients diagnosed between 1951 and 1966, 45 had ulcerative colitis and 3 had regional enteritis. In one of these 45 (a 19-yr-old woman), the erythema nodosum was detected first, followed later by the typical manifestations of ulcerative colitis; both conditions responded to therapy at the same time. It is concluded that erythema nodosum, which can be the manifestation of any acute infection or inflammation, most often appears during an acute flare-up of ulcerative colitis, but may occasionally precede the other diagnostic signs or symptoms of ulcerative colitis. The latter should therefore be considered in patients with erythema nodosum for which no other obvious cause has been found.

3296 **PROBLEM OF CANCER IN ULCERATIVE COLITIS.** *(E.)* McMillan, W. O. Jr. (Duke U. Med. Ctr., Durham, N. C.), J. T. Garbutt and J. M. Ruffin. *Southern Med. J.* 61(5):526-528, 1968.

Among 362 patients with chronic ulcerative colitis followed for extended periods, 10 (2.8%) developed carcinoma of the colon. The incidence of carcinoma was 10.5%, however, among 86 patients with disease extending beyond the rectosigmoid area who had been followed for 10 yr or more, compared to 6.8% among patients with extensive ulcerative colitis regardless of time of follow-up and 0% among 42 patients followed for 10 yr or more with disease not extending beyond the sigmoid. The 10 patients who developed carcinoma were then compared with 13 of the 86 patients, in whom a colectomy had revealed neither carcinoma nor granulomatous colitis. There were no significant differences between the carcinoma and no-carcinoma groups with regard to age at onset (3-48 yr, average 23 yr, and 7-53 yr, average 26 yr, resp.), duration of illness (11-37 yr and 10-27 yr, resp.), or extent of involvement (universal involvement in 9 of 10 and 11 of 13). Proctoscopy, however, revealed occult blood in 11 of 13 control cases (with white blood cells in 9 of 11) compared to only 5 of 10 cancer cases (white blood cells in 1 of 5). The clinical course of ulcerative colitis before detection of cancer had been quiescent for 2-11 yr in 9 of 10 (active for 25 yr in 1 of 10). Only 2 of 10 had a palpable mass, while 4 of 10 tumors were revealed by proctoscopy and 8 of 10 by X-ray. The interval of time between development of cancer and the last barium enema was 2-8 yr. All but 2 had metastases at the time of operation, and all but 3 (surviving at 9, 48 and 52 months, 1 of 3 with widespread metastasis) died in 1-4 months. Despite the lack of prognostic signs which would make it possible to predict the development of cancer in a particular patient, prophylactic colectomy is not recommended in the asymptomatic case. Rather, patients with longstanding disease extending beyond the rectosigmoid, followed by a quiescent phase, should be followed carefully with a barium enema at yearly intervals.

3297 **CRITICAL FOLLOW-UP OF SURGICALLY TREATED ULCERATIVE COLITIS.** *(E.)* Myers, R. T. (Bowman Gray Sch. Med., Wake Forest U., Winston-Salem, N. C.) and F. Hightower. *Ann. Surg.* 167(6):920-925, 1968.

A review of the patients admitted to the Wake Forest University Medical Center since 1949 with ulcerative diseases of the colon revealed 455 with ulcerative colitis, 91 of whom (45 males and 46 females, 14-72 yr old, with a duration of disease of 4 weeks - 18 yr, average 2.7 yr) underwent some form of surgery (elective in 79, emergency in 12). Surgery was made necessary by failure of medical therapy in 67 cases, fulminating toxic dilatation in 16, perforation in 6 and hemorrhage in 2; 65 patients had total involvement of the colon by ulcerative colitis. Surgical procedures included one-stage total colectomy (61 patients, with 6 deaths), total colectomy in 2 stages (18 patients, no deaths) and incomplete operations (12 patients, with 5 deaths). Steroids were used supportively in the 79 patients wh had received steroids preoperatively. The causes of the 11 operative deaths were postoperative sepsis (9), hepatic failure (1) and cardiac failure (1), but 6 of the 11 were in patients operated on as emergencies. Nine more patients died subsequently: 5 of unrelated causes, 3 of carcinoma and 1 of intestinal obstruction. Late complications included ileostomy obstruction (22), ileostomy fistula (5), intestinal obstruction (8), perineal sinus (6) and miscellaneous (5; foreign-body reactions, ventral hernia, i.p. abscess). The 91 patients included 6 with carcinoma (with a duration of ulcerative colitis of 8-15 yr, average 10.5 yr), 3 of whom died in 1-8 yr and 3 of whom survived 1-8 yr. All of the 71 survivors have gained weight, 68 are in good health, and 67 have returned to their usual work.

3298 **ADVERSE REACTIONS TO SALICYLAZOSULFAPYRIDINE (AZULFIDINE) IN THE TREATMENT OF ULCERATIVE COLITIS.** *(E.)* Collins, J. R. (Vanderbilt U. Sch. Med., Nashville, Tenn.). *Southern Med. J.* 61(4):354-358, 1968.

Based on 2 personal cases of Azulfidine toxicity and a review of the literature on the incidence and severity of toxic reactions to this drug, the author reexamines the rationale for the use of Azulfidine and other sulfa drugs in the treatment of ulcerative colitis. A 35-yr-old man first developed recurrent skin rash and arthralgia during prolonged Azulfidine therapy, followed eventually by tracheolaryngitis associated with thyroiditis of unknown origin which was also ascribed to the drug. A 43-yr-old Negro man developed a generalized desquamative skin rash with fever, chills and sore throat after receiving 4g/day for only 19 days. Minor adverse reactions such as nausea, fever and arthralgia occur in about 20% of patients on short-term therapy (9-60% depending on dosage and other factors). In addition, a significant number of serious adverse reactions have been reported, including agranulocytosis (at least 5 fatal cases), a variety of other blood dyscrasias, skin rashes, and others. Clinical studies have demonstrated unequivocally that sulfonamides have a beneficial effect in mild to moderately severe ulcerative colitis, but there is little experimental or theoretical foundation for their use. There is also little data to support the widespread preference for Azulfidine, which is one of the most toxic of the sulfonamides. It is therefore suggested that a less toxic sulfa drug, such as Sulfathalidine, be prescribed first in mild ulcerative colitis, followed by Azulfidine and/or corticosteroids only if a satisfactory remission is not obtained.

3299 **ULCERATIVE COLITIS AND ERYTHROCYTE G6PD DEFICIENCY; SALICYLAZOSULFAPYRIDINE-PROVOKED HEMOLYSIS.** *(E.)* Cohen, S. (U. S. Air Force Hosp., Chanute Air Force Base, Ill.), D. S. Rosenthal and P. J. Karp. *J.A.M.A.* 205(7):528-530, 1968.

The occurrence of hemolysis in 2 salicylazosulfapyridine-treated ulcerative colitis patients with erythrocyte glucose-6-phosphate dehydrogenase (G6PD) deficiency was observed. It has been previously demonstrated that sulfonamides precipitate hemolytic episodes in erythrocyte G6PD deficient subjects. The hepatic and colonic inflammation of ulcerative colitis represent potential stimuli for precipitating hemolysis in enzyme-deficient individuals. When salicylazosulfapyridine is added, such hemolysis should be considered as causing eventual anemia. Screening tests for G6PD deficiency should be performed in patients prior to therapy with potentially hemolytic agents.

3300 **PROCTOSIGMOIDITIS--A SPECIAL FORM OF CHRONIC ULCERATIVE COLITIS.** *(E.)* Freyberger, H. (Dept. Psychosom. Med., U. Hamburg, Germany) and K. M. Wieland. *Amer. J. Proctol.* 14(4):270-277, 1968.

The psychic factors which may be of importance relative to the manifestation or the relapse of proctosigmoiditis in 20 patients are studied and evaluated. The study group consisted of 8 males and 12 females, ranging in age from 13-56 yr, with a mean age of 31 at the onset of the disease, and a mean age of 33 at the beginning of treatment. Physical examination was normal; sigmoidoscopic examinations revealed the typical findings of ulcerative colitis. A prominence of dependent attitudes and depressions together with restricted capacities to tolerate frustrations, particularly object loss was found in these patients. The close relationship between depression manifestation and proctosigmoiditis development was evidenced by mood swings preceding the onset of proctosigmoiditis and mucosal reactions, including those after relapses, occurring within hours or days following frustration. The depressive traits of helplessness, hopelessness, and depressive anxiety became manifest after the onset of proctosigmoiditis. There was a fairly close correlation between the severity of the symptoms and the degree of helplessness as well as depressive anxieties of the patients. In the authors' opinion, the tissue reaction which forms the basis of colitis develops only in the case of a biological predisposition and the failure of adaptive behavior.

3301 **RADIO-IRON (^{59}Fe) STUDIES IN ACUTE ULCERATIVE COLITIS.** *(E.)* Ormerod, T. P. (Gordon and Westminster Hosp., London, England). *Scand. J. Gastroent.* 3(2):189-192, 1968.

Uptake and utilization of oral and parenteral ^{59}Fe were studied in 13 patients with acute ulcerative colitis. Five of the patients received i.v. ^{59}Fe. These patients showed more rapid plasma clearance and slightly more rapid red cell incorporation than were seen in 2 normal controls. Eight of the patients received oral ^{59}Fe. Their blood levels at 10-14 days were lower than those of 4 controls with simple iron deficiency. Impaired iron absorption probably accounts for the difference in red cell incorporation between the oral and i.v. groups; such impaired absorption may be due to small bowel changes accompanying ulcerative colitis. Iron malabsorption might explain the development of anemia in ulcerative colitis patients not losing much blood. In the absence of severe hemorrhage, it appears logical to treat the chronic anemia of ulcerative colitis initially with parenteral iron prior to blood transfusion, in order to replenish depleted iron stores.

3302 **MONDOR'S DISEASE IN A PATIENT WITH ULCERATIVE COLITIS.** *(E.)* Babb, R. R. (Palo Alto Med. Clin., Calif.). *Amer. J. Dig. Dis.* 13(7):674-676, 1968.

3303 **LOCAL AND SYSTEMIC COMPLICATIONS OF ULCERATIVE COLITIS.** *(E.)* Danovitch, S. (Nation. Inst. Arthritis & Metabolic Dis., Bethdsda, Md.). *Family Physician* 14(4):48-54, 1968.

3304 **A COMPARATIVE ANATOMICAL AND RADIOLOGICAL STUDY OF ULCERATIVE**

COLITIS. *(Fr.)* Liguory, C. (St. Antoine Hosp., Paris, France), F. Bouskela, Conte-Marti, L. A. Jourde and M. Conte. *Sem. Hop. Paris* 44(23/5):1572-1585, 1968.

3305 **CLINICAL EXPERIENCE AND DIAGNOSIS OF NONSPECIFIC ULCERATIVE COLITIS IN CHILDREN.** *(Rus.)* Kanshina, O. A. (I. V. Rusakov Child. Hosp., Moscow, USSR) and R. A. Sukholina. *Vop. Okhr. Materin. Dets.* (7):68-73, 1968.

3306 **INDICATIONS FOR COLECTOMY IN ULCERATIVE COLITIS.** *(Fl.)* Hellemans, N. (Int. Med. Clin., U. Groningen, Belgium). *T. Gastroent.* 11(1): 25-35, 1968.

3307 **ETIOPATHOGENESIS OF ULCERATIVE COLITIS.** *(Sp.)* Molina Alonso, L. *Medicina (Madrid)* 35(6):807-820, 1968.

3308 **THYMECTOMY IN ULCERATIVE COLITIS: CASE HISTORIES OF THE TREATMENT OF 7 PATIENTS.** *(Ger.)* Cesnik, H. (Surg. Clin., Graz U., Germany). *Langenbecks Arch. Klin. Chir.* 321(1):86-98, 1968.

See also abstract nos.: 2976

309 PLEOMORPHIC ADENOCARCINOMA OF THE PANCREAS: AN ANALYSIS OF FIVE CASES. *E.)* Guillan, R. A. (VA Hosp., Topeka, Kan.). *Cancer* 21(6): 072-1079, 1968.

mong 1528 autopsies performed in a period of 16 yr and 8 onths (1950-67), 39 (2.6%) revealed adenocarcinoma of the ancreas, and 5 of these tumors were pleomorphic adenocar- inomas. These tumors, the gross characteristics of which were he same as those of adenocarcinoma in general, were char- cterized by a strikingly distinctive histology, with mostly izarre mononuclear and multinucleated (with 5-10 nuclei) iant cells, often showing evidence of cannibalism. The tumors ere 6-15 cm in diameter at autopsy, with 3-8 metastatic foci er patient (most often in the liver and lungs, followed by the astrointestinal tract and bone). Tumor origin was in the body nd tail in 4 of 5 cases, in the head in 1; while 3 tumors riginated in the acini, 2 originated in the ductal epithelium. ll 5 patients were men, 59-75 yr old, and were inoperable. urvival from onset of symptoms (pain, weakness, depression, aundice, weight loss) was only 3-5 months, death being due o gastrointestinal hemorrhage (1 case), pulmonary infarction 1 case) or multiple metastases (3 cases). It is pointed out that he possibility of pleomorphic adenocarcinoma should be con- idered in the differential diagnosis of metastatic lesions with imilar histologic features.

3310 HETEROTRANSPLANTATION OF PANCREATIC ISLET CELL MASS FROM SHEEP TO DOGS. *E.)* Pepin, J. (Hahnemann Med. Coll., Philadelphia, Pa.), E. osaku, J. M. Howard and F. W. Pairent. *Arch. Surg.* 97(1): 18-123, 1968.

he pancreatic ducts were ligated in 11 sheep to produce estruction of the acinar tissue. Two or 3 days prior to trans- lantation 11 dogs were made diabetic by pancreatectomy. heep pancreas was then transplanted into the groin. Follow- ng the transplant, and until death ensued, each dog received mmunosuppressive therapy consisting of azathioprine (Imuran), mg/kg daily, orally; and prednisolone, 40 mg daily, i.m. he islet cell heterograph did not function in any dog. Autopsy evealed antimortem thrombosis in the anastomoses and nec- osis with no signs of cellular rejection. Serum glucose levels emained high and the blood insulin level did not increase above he normal fasting levels observed after pancreatectomy. Re- ection was dramatic in the animal receiving an unligated pan- reas. Five minutes after vascular continuity had been reestab- ished, areas of purplish discoloration appeared.

3311 AN ANALYSIS OF 46 AUTOPSY CASES OF JAPANESE CHILDREN, SHOWING IBROCYSTIC CHANGES OF THE PANCREAS AND ONE LINICAL CASE OF FIBROCYSTIC DISEASE. *(Jap.)* Komi, N. (Tokyo Med. & Dent. U., Japan) and Y. Seki. *Bull. Tokyo Med. Dent. Univ.* 14(4):407-414, 1967.

A study was made of 46 autopsy cases of Japanese infants and children less than five years of age who showed histological changes of the pancreas which were characteristic of fibrocystic disease. Included in the study were: age distribution; male to female ratio; body weight; classification of the main patho-anatomical diagnosis, and cause of death. It was recognized that fibrocystic changes of the pancreas are not a specific diagnostic finding of mucoviscidosis. However, since it is accepted as fact that fibrocystic disease of the pancreas is never seen in Oriental races, it was considered significant that these histological changes changes were found in 46 out of the 422 autopsy cases studied. A case of fibrocystic disease of the pancreas in a Japanese child was also reported. This was diagnosed by clinical symptoms, including chest X-ray and the presence of abnormally high sweat electrolyte levels.

3312 QUANTITATIVE ASSESSMENT OF EXOCRINE PANCREATIC FUNCTION IN INFANTS AND CHILDREN. *(E.)* Hardorn, B. (Dept. Pediat., U. Zurich, Switzerland), G. Zoppi, D. H. Shmerling, A. Prader, I. McIntyre and C. M. Anderson. *J. Pediat.* 73(1):39-50, 1968.

Evaluations of exocrine pancreatic function were made in 44 children, 10 with cystic fibrosis, 7 with exocrine pancreatic insufficiency not due to cystic fibrosis, and 27 with gastrointestinal diseases unrelated to pancreas or in the recovery phase of infectious disease. Duodenal juice samples were collected for 10-20 min before i.v. pancreozymin (2 U/kg) and secretin (2 U/kg) injection, and for 5 consecutive 10-min periods, thereafter. Volume, bicarbonate concentration, pH, trypsin, chymotrypsin, amylase, carboxypeptidase, and lipase activities were measured. All parameters showed individual variations in control subjects; variation was higher for enzyme data than for volume and bicarbonate concentration, with chymotrypsin displaying the least individual differences and lipase the greatest. Only the output of amylase was found to be age dependent. In cystic fibrosis, secretory volume and bicarbonate concentration, ductular activity, is more regularly affected than enzyme secretion or acinar activity. Volume is normal, bicarbonate low, and enzyme secretion grossly diminished in exocrine pancreatic insufficiency; thus, acinar activity is more regularly affected than ductular activity. Complete lipase deficiency is usually seen in pancreatic insufficiency; enzyme activity was absent in 2 insufficiency patients whose conditions were associated with severe hypoproteinemic edema and metaphyseal dysostosis with dwarfism, resp. This test has been found valuable in differentiating normal and aberrant exocrine function in children.

3313 REPRODUCTIVE FAILURE IN MALES WITH CYSTIC FIBROSIS. *(E.)* Kaplan, E. (Harvard Med. Sch., Boston, Mass.), H. Shwachman, A. D. Perlmutter, A. Rule, K. Khaw and D. S. Holsclaw. *New Eng. J. Med.* 279(2):65-69, 1968.

Aspermia was found in 25 patients with cystic fibrosis, 17 to 35 years of age. Semen volume was reduced and more acidic than that of 5 healthy controls. In 5 samples chemically analyzed, fructose concentration was decreased, and citric acid contentration and acid phosphatase activity were significantly increased. Autopsy and surgical specimens revealed bilateral absence of the vas deferens. The testes were normal to diminished in size. The epididymides were reduced in size or partially absent. Decreased spermatogenesis with frequent abnormal forms was found. Clinical examination of an additional 28 postpubertal males with cystic fibrosis revealed normally developed external genitalia with unilateral or bilateral small testicles in 10 patients, incompletely developed epididymides in 22 patients, and a palpable vas deferens in only 4 patients. Reproductive failure is primarily due to the lack of normal anatomic transport of spermatozoa from the testes.

3314 CARCINOMA OF PANCREAS SIMULATING GIANT CELL TUMOR OF BONE. ELECTRON-MICROSCOPIC EVIDENCE OF ITS ACINAR CELL ORIGIN. *(E.)* Rosai, J. (Washington U. Sch. Med., St. Louis, Mo.). *Cancer* 22(2):333-344, 1968.

Two cases of large, locally invasive primary pancreatic neoplasms histologically indistinguishable from a giant cell tumor of bone are presented. Light microscopy of the surgical specimens revealed tumors consisting of osteoclast-like multinucleated giant cells regularly distributed between small mononuclear "stromal" cells. No evidence of epithelial differentiation was found. Results of histochemical reactions were comparable to giant cell tumors of bone. Electron microscopy performed in 1 case revealed abundant granular endoplasmic reticulum containing intracisternal granules of proteic nature similar to those described in pancreatic acinar cells. Microvilli were present in the giant cells and numerous desmosomes were found between the "stromal" cells. These fine structural features are highly suggestive that acinar elements are the cells of origin of the tumor.

3315 CHRONIC ALCOHOLISM AND CARCINOMA OF THE PANCREAS. *(E.)* Burch, G. E. (Tulane U. Sch. Med., New Orleans, La.) and A. Ansari. *Arch. Intern. Med.* 122(3):273-275, 1968.

On the basis of hospital records and questionnaires sent to relatives of 83 patients with carcinoma of the pancreas, 62 (74.7%) were moderate to heavy chronic alcoholics, 14 (16.9%) were nonalcoholics, and in 7 (8.4%) no history was available. In 100 control patients, comparable in age, sex, and race, only 14% were moderate to heavy chronic alcoholics, 70% were "social" drinkers, and 16% were nonalcoholics. Family history for any cancer was negative in 97.5% of the 83 patients. A 75% incidence of chronic alcoholism in patients with carcinoma of the pancreas as compared to a 14% incidence in control subjects is significant.

3316 FAT ASSIMILATION AFTER MASSIVE DISTAL PANCREATECTOMY. *(E.)* Kalser, M. H. (U. Miami Sch. Med., Fla.), C. A. Leite and W. D. Warren. *New Eng. J. Med.* 279(11):570-576, 1968.

Fat assimilation was determined by 219 daily balance studies in 7 patients with massive distal pancreatectomy for pancreatitis with preservation of the integrity of the gut lumen. In 6 patients with a 95% pancreatectomy, a mean of 80% of ingested fat was assimilated. Fat absorption was increased to the same degree whether pancreatic replacement therapy was given with meals or every hour while awake. In 1 patient with a 75% pancreatectomy, fat assimilation was normal. Lipase concentration of jejunal aspirates was 10% that of controls. Triglyceride hydrolysis was normal, but lipolysis of diglycerides was impaired. Five patients had impaired glucose metabolism requiring 22 to 50 U of insulin daily. The intact mechanism of normal flow of bile into the duodenum is probably the major reason for the minimal defect of fat utilization as compared to that after pancreaticoduodenectomy.

3317 PSEUDOCYSTS OF THE PANCREAS. *(E.)* Shockman, A. T. (VA Hosp., Philadelphia, Pa.) and J. A. Marasco. *Amer. J. Roentgen.* 101(3):628-638, 1967.

3318 DUODENAL OBSTRUCTION IN THE NEWBORN DUE TO ANNULAR PANCREAS. *(E.)* Free, E. A. (U. Arkansas Med. Ctr., Little Rock) and B. Gerald. *Amer. J. Roentgenol.* 103(2):321-325, 1968.

3319 SIDE-TO-SIDE DUODENODUODENOSTOMY FOR OBSTRUCTING ANNULAR PANCREAS IN THE NEWBORN. *(E.)* Feuchtwanger, M. M. (Hadassah Hebrew U. Sch. Med., Jerusalem, Israel) and Y. Weiss. *J. Pediatric Surg.* 3(3):398-401, 1968.

3320 CANCER OF THE PANCREAS. *(E.)* Bouchier, I. A. D. (Royal Free Hosp., London, England). *Brit. Med. J.* 3(5611):169-171, 1968.

3321 DIABETES MELLITUS AND CARCINOMA OF THE PANCREAS. *(E.)* Karmody, A. (Dept. Surg., Royal Infirm., Glasgow, Scotland) and J. Kyle. *Bull. Soc. Int. Chir.* 27(2):119-123, 1968.

3322 METABOLISM IN NORMAL AND PANCREATECTOMIZED DOGS DURING STEADY-STATE EXERCISE. *(E.)* Issekutz, B. (Lankenau Hosp., Philadelphia, Pa.) and H. I. Miller. *Amer. J. Physiol.* 213(4):857-862, 1967.

3323 ASPECTS OF PANCREATIC MORPHOLOGY AND FUNCTION IN THE AGED. *(Rev.)(It.)* Rosa, L. (Inst. Gen. Clin. Med., U. Bologna, Italy), G. Gasbarrini, L. Barbara, G. Fontana, F. Faggioli, P. Vannini, L. Gandolfi, S. Moretti, E. Ferrandino, F. Miglio, N. Melchionda, A. Venerato, P. Azzaroli, F. Addari and F. Tabarroni. *G. Geront.* 15(10):1127-1242, 1967.

3324 PROBLEMS OF RESUSCITATION FOLLOWING DUODENOPANCREATECTOMY FOR LITHIASI OF THE HEAD OF THE PANCREAS (REPORT OF 53 CASE *(Fr.)* Michel, A. J. D. (Hotel Dieu, Lyon, France), G. Guillemi J. Dubois, G. Spay, D. Montagne and J. P. Bernard. *Ann. Anesth. Franc.* 9(1):101-106, 1968.

3325 ON THE PATTERN OF ENZYMES OF THE NORMAL AND THE INJURED EXOCRINE PANCREAS. *(E.)* Berndt, W. (U. Hamburg Med. Clin., Germany), U. Garmsen and H. Bartelheimer. *Amer. J. Proctol.* 19(2):278-285, 1968.

3326 **PANCREAS TRAUMA.** *(Sp.)* Bilesio, E. A. (Buenos Aires, Argentina), A. L. Artana, J. Szereszewski and R. Cabrejas. *Prensa Med. Argent.* 55(8):359-365, 1968.

3327 **PANCREATIC INJURY.** *(E.)* McCrocklin, K. H. (U. Louisville Sch. Med., Kentucky). *J. Kentucky Med. Ass.* 66(7):613-617, 1968.

3328 **THE CURRENT STATUS OF PANCREATODUODENECTOMY FOR MALIGNANT LESIONS OF THE PANCREAS.** *(E.)* Jordan, G. L. Jr. (Houston, Texas). *Surg. Gynec. Obstet.* 127(3):598-599, 1968.

3329 **AN ATYPICAL *ESCHERICHIA COLI* ASSOCIATED WITH CYSTIC FIBROSIS OF THE PANCREAS.** *(E.)* Kilbourn, J. P. (U. Oregon Med. Sch., Portland), J. L. Grach and R. A. Campbell. *J. Pediatrics* 73(3):408-411, 1968.

See also abstract nos.: 2903,2920,2945,2993,3641

3330 **INFLUENCE OF HIGH PROTEIN DIET ON CHRONIC PANCREATITIS.** *(E.)* Tuzhilin, S. A. (Min. Railway Svc. Hosp., Moscow, USSR). *Amer. J. Gastroent.* 48(2):103-109, 1967.

Among 40 patients with confirmed chronic pancreatitis treated for 3 weeks with a 2800-calorie high-protein diet consisting of 140-150 g protein, 80 g fat and 360-370 g carbohydrate per day, in the absence of all other treatment except analgesics, most showed clinical improvement and very few showed actual deterioration. In contrast, among 20 patients who were kept on a normal 2800-calorie diet with 80 g protein, 80 g fat and 430 g carbohydrate, very few signs and symptoms improved and most showed significant deterioration. Pain, for example, improved in 25 of 34 on a high-protein diet and in 0 of 17 controls, regurgitation improved in 19 of 29 and 2 of 12, resp., heartburn improved in 7 of 10 and 3 of 9, meteorism in 10 of 14 and 1 of 7, weakness in 26 of 33 and 0 of 14, tenderness to palpation in 23 of 34 and 0 of 17, and hyperesthesia in 13 of 18 and 1 of 13, resp. Deterioration was seen in only 1-2 patients on the high-protein diet and in as many as 11 (for pain and tenderness to palpation) on the normal diet. The only exception was stool appearance and weight loss, which became worse in 10 and 8 of 40 on the high-protein diet, resp., and improved in only 9 and 7. In the patients on the high-protein diet, the serum trypsin and amylase levels decreased (from 11.7 to 6.6 and from 122 to 109, resp.) while the trypsin inhibitor levels and ratios between trypsin-inhibitor and trypsin increased significantly (from 472 to 538 and from 50 to 169, resp.). The changes in the duodenal contents in these patients were in the opposite direction. In the control group, on the other hand, the trypsin, lipase and amylase levels in the duodenal contents tended to decrease, with an increase in the trypsin-inhibitor: trypsin ratio, while the only change in the serum was an increase in the serum amylase (from 104 to 152). It is concluded that a high-protein diet has a beneficial effect on the course of chronic pancreatitis, and is not contraindicated by the exocrine secretion of large amounts of pancreatic enzymes.

3331 **EXCRETION OF ANTIBIOTICS IN PANCREATIC JUICE: STUDIES IN DOGS WITH NORMAL PANCREAS AND WITH ACUTE PANCREATITIS.** *(E.)* Wyman, J. B. (Mayo Clin., Rochester, Minn.), L. G. Bartholomew, A. G. Karlson, K. G. Wakim and J. C. Cain. *Gastroenterology* 53(6):930-940, 1967.

In 11 healthy female dogs, previously subjected to cholecystectomy and bearing an indwelling Thomas cannula for the collection of pancreatic juice, various antibiotics were infused i.v. (10-20 mg/kg in 10 min) and pancreatic flow was stimulated by instillation of HCl into the duodenum. Low concentrations of erythromycin and lincomycin were excreted in the pancreatic juice, probably by passive diffusion from the blood, while kanamycin, colistin and tetracycline did not appear in the pancreatic juice in measurable amounts. After 10 mg/kg of erythromycin, the pancreatic excretion averaged 22-103 μg (mean 0.04%) in 8 hr and the mean concentration in the pancreatic juice was 1.3 μg/ml. After 20 mg/kg, the pancreatic excretion averaged 102-255 μg (mean 0.1%) in 4 hr and the mean concentration in the pancreatic juice was 3.2 μg/ml. Only one dog excreted an erythromycin concentration of more than 20 μg/ml in the pancreatic juice, this being 30 min after the end of the infusio After lincomycin, an average of 219 μg (0.1%) was excreted in 8 hr and the mean concentration in the pancreatic juice was 1.7 μg/ml. The serum levels for lincomycin were considerably higher than the levels in the pancreatic juice, while for erythromycin they were about the same. The levels of all the antibiotics were much higher in pancreatic, renal and hepatic tissue than in the serum, however. In 13 female dogs, prepare in the same way, in which acute pancreatitis had been induced by intraductal instillation of dilute staphylococcal toxin, the erythromycin excretion in the pancreatic juice was essentially the same as in healthy dogs, although the serum levels were initially somewhat higher. Four hours after the infusion, wher the serum level was about the same as in normal animals, the concentrations of erythromycin in the pancreatic, hepatic and renal tissue were much lower than in normal dogs: 25 and 75 μg/g, resp., for the pancreas, 17 and 3.5 μg/g for the kidne and 12 and 5 μg/g for the liver. The concentrations attained in acute pancreatitis were still bacteriostatic, however. It is concluded that the normal or acutely inflamed pancreas does not actively secrete any of the antibiotics studied, and that none of these antibiotics would be suitable as a test of pancreatic exocrine function.

3332 **ACUTE PANCREATITIS, ETIOLOGY AND PREVENTION OF RECURRENCE. FOLLOW-UP STUDY OF 188 PATIENTS.** *(E.)* Edlund, Y. (Sahlgrensk Sjukhuset, U. Göteborg, Sweden), B. Norbäck and L. Risholm. *Rev. Surg.* 25(3):153-157, 1968.

Follow-up examination 2 to 7 years after an attack of acute pancreatitis in patients who did not undergo surgery at the time of the attack was used to evaluate: 1) the incidence of gallstone disease; 2) the value of cholecystectomy and choledocholithotomy in the prevention of recurrent acute pancreatitis; 3) the degree of alcoholism present and the importance of alcoholic complications; 4) the effect of abstinence from alcohol in preventing recurrence; and 5) the incidence of othe gastrointestinal symptoms in patients having neither gallstone disease nor alcohol injury. The mortality in acute pancreatitis is about 10% regardless of etiology. Gallstone disease was fou in 68% of the acute pancreatitis patients; acute pancreatitis was slightly more common as a complication of gallstone disease in men than in women. Cholecystectomy is recommended for these patients. Adequate exploration of the biliar ducts was thought to prevent recurrence of pancreatitis in mo cases. Acute pancreatitis was associated with excessive alcoho intake in 13% of the cases, almost all men. Hard liquor is the worst offender; wine and beer are not usually as harmful. To abstinence was found effective in preventing relapses where acute pancreatitis had been associated with drinking; continue drinking led to recurrence of pancreatitis in every case. In 12 of the patients, neither gallstone disease nor a history of drink ing was present. Many of these patients had atypical abdomin symptoms resembling those of "biliary dyskinesia."

3333 **RESULTS OF PANCREATICOJEJUNOSTOMY FOR PANCREATITIS AND CANCER OF THE**

PANCREAS. *(E.)* White, T. T. (Dept. Surg., King County, Swedish & U. Hosps., Seattle, Washington). *Amer. Surg.* 34(7): 514-518, 1968.

The immediate and long-term results of pancreaticojejunostomy in 22 patients with chronic pancreatitis and 8 patients with pancreatic carcinoma are reviewed. The 22 chronic pancreatitis patients were divided into 3 groups: 1) The first group consisted of 16 patients who had had the disease for 5 or more years. In these patients, the pancreatic duct was greatly dilated (1 cm or more) and the surrounding pancreas was small and hard; there was little inflammatory reaction at the time of pancreaticojejunostomy. A single long incision sufficed to open up the pancreas satisfactorily. Of these 16 patients, 15 are now free of pain and one has succumbed to drug addition. 2) The second group consisted of 2 patients with proliferative pancreatitis and an enlarged duct surrounded by a pancreas 3-4 times normal size. Proper drainage requires removal of a V-shaped piece of tissue adherent to the duct. Splanchnicectomy may be necessary to relieve pain if there is an active process involving the posterior abdominal nerves. 3) The third group consisted of 4 patients with a history of pain and a dilated duct behind an area of necrotic tissue. Wide opening of the duct and proper drainage affords long-term cure or relief of symptoms. Of the 6 patients with carcinoma of the head of the pancreas, 5 underwent loop pancreaticojejunostomy and 1 underwent a Roux-en-Y procedure. A T-tube was placed in the duct and brought out distally through a Witzel enterostomy in the jejunal wall. All these patients have experienced marked though not complete relief of pain. The large anastomosis is preferable for pain relief in patients with large proliferative pancreatitis or with areas of recent necrosis. Approximately 75% of chronic pancreatitis patients with dilated ducts will have good results. Of 8 patients treated by pancreaticojejunostomy 5 or more years ago, two died within 2 years, one of alcholism and the other of drug addiction. The remaining 6 have suffered no recurrent pain.

3334 URINARY AMYLASE AND ACUTE PANCREATITIS: AN EXPERIMENTAL STUDY IN THE DOG. *(Fr.)* Delcourt, A. (Ixelles Hosp., Brussels, Belgium), P. Wettendorff and P. Askenasi. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):31-36, 1968.

In dogs anesthetized with nembutal and bearing in-dwelling catheters in the duct of Wirsung, the ureters, the femoral vein and the carotid artery, stimulation of pancreatic amylase secretion by i.v. infusion of secretin or pancreozymin after ligation of Wirsung's duct led to significant increases in serum amylase but no appearance of amylase in the urine until threshold levels of 1116-3360 (average 2100) units percent had been surpassed. When stimulation was prolonged, or bile salts were injected into Wirsung's duct, the urinary amylase increased somewhat, but the highest level attained was only 4206 units percent at a serum amylase of 12,288 units percent; the amylase clearance varied from 1 to 34 ml. There was a slight increase in urinary amylase excretion after i.v. infusion of probenecid (25-100 mg/kg), which inhibits the renal tubules, but no significant change in either the serum amylase or the amylase clearance. It is therefore concluded that pancreatic amylase is not excreted by a tubular mechanism in the dog. These results are of interest in connection with the normal absence of urinary amylase in dogs, and with the finding that the urinary amylase levels remain elevated for longer periods than the serum amylase in patients with acute pancreatitis.

3335 HYPOTHERMIC PERITONEAL DIALYSIS IN THE TREATMENT OF ACUTE EXPERIMENTAL HEMORRHAGIC PANCREATITIS. *(E.)* Rasmussen, B. L. (U. Utah Sch. Med., Salt Lake City). *Amer. J. Surg.* 114:716-721, 1967.

The author induced acute hemorrhagic pancreatitis in 27 dogs using the method of Elliot, Williams and Zollinger. Ten control dogs received no treatment. Eight (80%) died within 36 hr; the survivors were severely ill with vomiting and prostration. SGOT and serum amylase valves showed a rise to maximal levels within the first hour of induction. Central venous pressure fell rapidly and the hematocrit rose steadily. Autopsy revealed hemorrhagic gelatinous pancreas and marked fat necrosis, hemorrhage and distortion of architecture. Nine dogs received 20 cc/kg/hr of Ringer's lactate solution i.v. , for the first 6 hr of pancreatitis induction. Seven (77%) died. There were no significant differences between these dogs and the controls except for a smaller hematocrit rise and a greater volume of peritoneal exudate. Ringer's lactate solution in no way appeared to alter the course of the disease. A 3rd group, consisting of 10 dogs, received peritoneal dialysis using 6 L of isotonic dialyzing fluid cooled to 4C. This was performed over a 6 hr period beginning 30 min after pancreatitis induction. Two dogs (20%) died. At 24 hr there was a striking difference between these dogs and the controls. They were on their feet and walking and showed suprising vigor. A rapid fall in central venous pressure rose again as dialysis continued. The mean arterial pressure showed an early fall and then a gradual decline. The cooling produced brady cardia, slowing of respiration, a fall in white cell count, and EKG changes. Serum enzymes were lower than in the control animals. Rectal temperature decreased 1 or 2 degrees in dogs weighing less than 10 kg. Autopsy showed a firm pancreas with little hemorrhage and less fat necrosis. Histologic sections showed edema and necrosis but there was good preservation of the vasculature and architectural structure.

3336 ACUTE HEMORRHAGIC PANCREATIC NECROSIS. *(E.)* Kazmers, N. (Kelsey Mem. Hosp., Lakeview, Mich.). *J. Abdom. Surg.* 10(8):216-219, 1968.

The clinical manifestations, diagnosis, etiology, course, complications and treatment of acute hemorrhagic pancreatic necrosis (the sudden enzymatic destruction of the pancreatic parenchyma due to escape of activated proteolytic enzymes into the glandular tissue) are discussed on the basis of 9 cases (6 men and 3 women, 51-80 yr old) encountered among 71 patients with pancreatitis of varying severity. Among the 62 patients with mild-moderate pancreatitis, 4 died of associated illness. Both patients in whom the acute hemorrhagic pancreatitis was not suspected and who were therefore treated symptomatically died, as did 4 of the 7 treated with conventional methods (fluid and electrolyte replacement, alkalinization, antibiotics, nasogastric decompression, and prevention of increased gastric secretion and intestinal distension) and Trasylol. The 3 survivors included a 69-yr-old man with acute postoperative pancreatitis (shock, coma, hyperamylasemia and livedo reticularis) following subtotal gastric resection for bleeding duodenal ulcers, and 2 men with surgically proven hemorrhagic pancreatitis thought to be due to alcohol. The 6 deaths included 2 due to postoperative pancreatitis following transduodenal sphincterotomy for cholelithiasis and common bile duct obstruction, 2 due to chronic cholelithiasis not treated by sursurgery, and 2 due to arteriosclerotic cardiovascular disease. Abdominal pain was excruciating in 2 of the 9 cases, moderately severe in 4 of 9. Circulatory collapse occurred in 7 cases, livedo reticularis in 3, and 4 patients vomited. The serum amylase was elevated in 6 of 9, all had leukocytosis, and 3 had severe metabolic acidosis. Acute renal failure was seen in 5 cases, 7 had elevated blood urea nitrogen levels, and arteriosclerotic renal changes were seen in 5 of the 6 deaths. Massive hemorrhage from acute gastric ulcers occurred in 2 patients, pancreatic abscesses in 2, duodenal obstruction in 3 (complete in 2 of 3), abdominal ascites in 3, pleural ascites in 3, hyperglycemia in 4, hypocalcemia in 3 and increased prothrombin time in 3.

3337 **ACUTE HEMORRHAGIC PANCREATITIS AND OTHER VISCERAL CHANGES ASSOCIATED WITH ACUTE ENCEPHALOPATHY: A REPORT OF THREE CASES.** *(E.)* Stover, S. L. (Children's Hosp., Philadelphia, Pa.), P. Wanglee and C. Kennedy. *J. Pediat.* 73(2):235-241, 1968.

Autopsies on 3 children revealed that death was attributable to acute hemorrhagic pancreatitis with acute encephalitis. The clinical picture and laboratory data resemble other reported cases described with encephalopathy and fatty degenerative visceral changes. These cases may represent a more violent response to viral infection, with the pancreas being affected by the encephalopathy. More sensitive antibody detection techniques and more diligent attempts at virus isolation may help identify an etiological factor. There is a possibility that steroid therapy, hypothermia, and mechanical ventilation could enhance this viral response.

3338 **THE ROLE OF ELASTASE IN ACUTE PANCREATITIS. I. INTRAPANCREATIC ELASTOLYTIC ACTIVITY IN BILE-INDUCED ACUTE PANCREATITIS IN DOGS.** *(E.)* Geokas, M. C. (Dept. Invest. Med., McGill U., Montreal, Canada), R. Murphy and R. D. McKenna. *Arch. Path.* 86(2):117-126, 1968.

Quantitative determinations of pro-elastase in the head, body, and tail of the pancreas were made in 34 mongrel dogs sacrificed at 5 min, 60 min, and 3 hr after having acute pancreatitis induced by the intraductal injection of autologous bile. A significant decrease of pro-elastase content occurred in the most involved part (tail) of the pancreas as compared with the least involved part (head); moderately decreased values were found in the body of the pancreas. Histological sections of the tail showed vascular destruction including elastolysis and thrombosis in the 60 min and 3 hr samples. The significance of elastase in clinical pancreatitis is still undefined.

3339 **THE ROLE OF ELASTASE IN ACUTE PANCREATITIS. II. INTRAPANCREATIC ELASTOLYTIC ACTIVITY IN TRYPSIN-INDUCED ACUTE PANCREATITIS IN DOGS.** *(E.)* Geokas, M. C. (Dept. Invest. Med., McGill U., Montreal, Canada). *Arch. Path.* 86(2):127-134, 1968.

Quantitative determinations of free elastase and its zymogen, and histological evidence of elastolysis, interstitial hemorrhage and thrombosis in trypsin-induced pancreatitis are presented from studies on 41 mongrel dogs (10-18 kg) injected via the pancreatic duct with 10 ml of a 50 mg solution of crystalline trypsin; 14 dogs were killed at 5 min, 17 at 60 min, and 10 at 3 hr after injection. Acute hemorrhagic pancreatitis developed in all cases, with most of the histological damage occurring in the tail of the pancreas. No significant difference between free elastase content of the pancreas head and tail was observed in the 14 dogs killed at 5 min; proelastase and total elastase of the head and tail of the pancreas differed significantly. There was a significant difference in free elastase, proelastase, and total elastase of the head and tail of the pancreas in the 60-min pancreatitis dogs. In 3-hr pancreatitis dogs, no significant difference was observed in free elastase content of the head, body, and tail of the pancreas; a significant decline in proelastase and total elastase was observed in the tail as compared to the head of the pancreas. The decrease in proenzyme in all dogs was significant. Extracts from pancreas specimens of 36 trypsin-pancreatitis dogs showed moderate decreases in elastase inhibitory activity from tail extracts in 60-min pancreatitis and increases in 5-min, and 3-hr pancreatitis; there was no significant difference in inhibitory activity of the head and tail. A moderate progressive inhibitory activity increase was seen in the head at 5- and 60-min and 3-hr pancreatitis, and in the tail between the 5-min and 3-hr disease. No elastase activity was found in ascitic fluid from 2 dogs with 60-min pancreatitis. Focal liquefaction necrosis, interstitial hemorrhage, interlobular septa edema, and fat necrosis were observed histologically at 5 min. Each parameter was more extensively damaged in 60-min pancreatitis; arteries showed elastic tissue loss in the adventitia. Complete venous elastic tissue loss and wall destruction of arterial elastic with intraluminal arterial and venous thrombosis were observed. Three-hr pancreatitis was also marked by destruction of arterial elastic lamina and that of companion vein walls, and arterial and venous thrombosis. It is concluded that pancreatic elastase is an important factor in trypsin-induced pancreatitis vascular injury.

3340 **THE ROLE OF ELASTASE IN ACUTE PANCREATITIS. III. THE DESTRUCTIVE CAPACITY OF ELASTASE ON PANCREATIC TISSUE *IN VIVO* AND *IN VITRO*.** *(E.)* Geokas, M. C. (Dept. Invest. Med., McGill U., Montreal, Canada). *Arch. Path.* 86(2):135-141, 1968

Acute hemorrhagic pancreatitis was induced by intraductal pancreatic elastase (1925 U/10 ml of water) in 5 fasting mongrel dogs (12-15 kg). The dogs were killed at 60 min and the pancreas excised, analyzed for free and total elastase, elastase inhibitory activity, and examined for histological pathology related to elastase injection. Pancreatic tissue from 2 normal dogs was incubated with elastase, and histologically stained with Verhoeff's elastin stain and Masson's trichrome. Immediately after elastase injection, small punctate hemorrhages and edema were observed in the tail and part of the body of the pancreas; confluent hemorrhages and congestion marked the pancreas surface, but the organ head remained intact. Hemorrhagic pancreatitis had developed at 60 min, and ascites had accumulated. There was no significant difference in free-elastolytic activity between the head and the tail of the pancreas; total elastase activity was substantial at the tail. There was no significant difference between inhibitory activity in the pancreas head and tail. Microscopic examination revealed severe edema and hemorrhage in interlobular septa; parenchymal necrosis resembled the liquefaction necrosis induced by trypsin injection. Thrombi were seen in small and medium-sized veins, with alterations in venous elastic component observable. Arteries lost adventitial elastic tissue. Incubation studies revealed the destructive capacity of elastase on pancreatic parenchyma and vessel walls; the dissolution of elastic fibers was proportional to the enzyme concentrations. Further studies are required to confirm whether elastase is capable of digesting viable parenchymous cells under optimum pH and temperature. The results of this study and those of trypsin-induced pancreatitis studies strongly indicate that elastase plays a major role in producing the observed vascular injuries.

3341 **TRAUMATIC PANCREATITIS AND PSEUDOCYST IN CHILDHOOD.** *(E.)* Othersen, H. B. Jr. (Ohio State U. Coll. Med., Columbus), F. T. Moore and E. T. Boles. *J. Trauma* 8(4):535-546, 1968.

The diagnosis and treatment of pancreatic injury due to blunt trauma are discussed on the basis of experience with 23 children (16 boys and 7 girls, 1.5-12 yr old) treated successfully at the Children's Hospital in Columbus in the period 1954-67. Injuries were caused by bicycle handlebars (5 cases), auto accidents (4), falls (6) and miscellaneous (8). Pseudocyst of the pancreas developed in 6 of these children (4 boys and 2 girls, 2-11 yr old), 4 of them due to blunt trauma localized to the epigastrium; only 1 of these children had associated injuries (fracture), and all were treated surgically 2-42 days after the accident. Most presented with vomiting and abdominal pain, 5 had a palpable abdominal mass, 5 showed radiological displacement of the stomach and/or colon, and 4 of 5 tested showed elevated serum amylase levels. Five were treated by evacuation of the cyst and insertion of a catheter for drainage (continuing an average of 3-4 weeks), while 1 was treated by resection of the tail of the pancreas. There were no recurrences, fistulas or other complications in these patients. Among the other 17 children, who did not develop a pseudocyst, 12 had associated injuries, and 16 showed elevated serum amylase levels. Four were operated on for associated injuries and 13 were treated without surgery. Complications developed in 2 of these patients: 1 with gastric hemorrhage which stopped without surgery, and 1 with severe chronic pancreatitis due to scar obstruction at the ampulla of Vater, necessitating pancreaticojejunostomy. It is concluded that traumatic pancreatitis in childhood is not rare, and that more cases would be detected by routine serum amylase determinations in patients suffering blunt abdominal trauma. Pancreatic injury can frequently be managed by medical means, but patients suffering localized injury to the epigastrium should be carefully watched for the development of a pseudocyst. External catheter drainage is an effective technique for the treatment of pseudocyst in children, in whom there is no underlying pancreatic disease and no ductal obstruction.

3342 **ACUTE HEMORRHAGIC PANCREATITIS AND OTHER VISCERAL CHANGES ASSOCIATED WITH ACUTE ENCEPHALOPATHY.** *(E.)* Stover, S. L. (U. Pennsylvania Sch. Med., Philadelphia), P. Wanglee and C. Kennedy. *J. Pediat.* 73(2):235-241, 1968.

Three children having clinical manifestations of acute encephalopathy were found to have acute hemorrhagic pancreatitis in addition to the cerebral lesion at postmortem examination. The pathological findings in the brain were nonspecific changes, as opposed to the findings of postinfectious encephalitis. Associated fatty degeneration of the liver was found in 2 patients, and 1 instance each of fatty degeneration of the renal-tubular epithelium, duodenal ulceration, and adrenal hemorrhage was also found. No infectious disease contacts were known, nor did the history suggest a toxic etiology. Moderate hypothermia was used in all patients. Steroid therapy was given for 2 days in 2 patients, and for 6 days in 1 patient. The acute hemorrhagic pancreatitis was thought to be a part of the general disease process; acute encephalopathy dominating the clinical picture with variable visceral responses. The variations of the syndrome could be explained by a variable host-immune response to a viral infection.

3343 **PERITONEAL PERFUSION WITH ENZYME INHIBITORS IN THE TREATMENT OF ACUTE EXPERIMENTAL PANCREATITIS.** *(It.)* Lojacono, L. (Inst. Gen. Clin. Surg., Cath. U. Sacred Heart, Rome, Italy), F. Crucitti, G. Tamborini, E. Alcini and A. Wiel Marin. *Chir. Pat. Sper.* 15(2):182-202, 1967.

Acute necrohemorrhagic pancreatitis was produced in 3 groups of 5 adult dogs by the technique of Hureau et al. *(Presse Med.* 71:170, 1963); 30 minutes later, the experimental group was treated by peritoneal perfusion with the enzyme inhibitor Trasylol (100,000 U in 20 ml solution per 3 hr), while a comparison group was treated by peritoneal dialysis with Baxter's solution (1000 ml in 3 hr) and the controls were perfused with saline (20 ml in 3 hr); treatment and observations were continued for 12 hr. Although the serum calcium, urine volume, and systolic and diastolic pressure decreased continuously in all 3 groups, the decreases in blood pressure were significantly less pronounced in the group treated with Trasylol (21% decrease in systolic pressure in 3 hr compared to 30-31%, and 29% decrease in diastolic pressure in 12 hr compared to 54-68%). The serum alkaline phosphatase, serum lipase, urinary amylase and hematocrit increased initially in all 3 groups; in the controls, however, these increases were continuous, reaching maximal values at 12 hr, while in the group treated with Trasylol the increases were either much less marked (maximal increase in serum alkaline phosphatase of 39% compared to 87-129%) or were transitory, being followed by decreases to normal values (hematocrit) or below (serum lipase and urinary amylase). The group treated by peritoneal dialysis showed an intermediate behavior. The total blood volume and plasma volume decreased continuously in the 2 control groups, while in the treated group the decrease was transitory. The serum amylase showed very little change in the treated group, while the other 2 groups showed slight increases followed by a decrease. While the serum acid phosphatase showed an initial drop and than an increase in all 3 groups, the peritoneal amylase showed an initial increase followed by a decrease in both treated groups (compared to a continuous increase in controls), and the peritoneal phosphatases showed a slight increase in both controls and Trasylol-treated animals, although decreasing continuously in those treated by peritoneal dialysis. Autopsy showed mainly edema in the Trasylol-treated dogs, compared to the severe hemorrhagic necrosis in the controls. Statistical analysis of these results indicates that intraperitoneal perfusion with enzyme inhibitors is of definite value in experimental pancreatitis, although a complete cure would also require intravenous inhibitor therapy and supportive treatment.

3344 **RECURRENT PAROTID SWELLING; ARTERIAL HYPERTENSION, AND PANCREATITIS.** *(E.)* Isenberg, J. (VA Ctr., Los Angeles, Calif.) and J. D. Boyle. *Gastroenterology* 55(2):277-281, 1968.

3345 **PANCREATITIS. III. PANCREATITIS RELATED TO TRAUMA, DUODENAL ULCER, AND SURGERY.** *(E.)* White, T. T. (Seattle, Washington), J. Murat and A. Morgan. *Northwest. Med.* 67(6):557-560, 1967.

3346 **THE SURGICAL TREATMENT OF PANCREATITIS.** *(E.)* Royer, T. C. (Geisinger Med. Ctr., Danville, Pa.). *Bull. Geisinger. Med. Ctr.* 20(2):175-179, 1968.

3347 **PATHOGENESIS AND ETIOLOGY OF PANCREATITIS.** *(E.)* Evans, P. C. (Geisinger Med. Ctr., Danville, Pa.). *Bull. Geisinger. Med. Ctr.* 20(2):165-169, 1968.

3348 **MEDICAL MANAGEMENT OF ACUTE PANCREATITIS.** *(E.)* Castle, L. W. (Geisinger Med. Ctr., Danville, Pa.). *Bull. Geisinger. Med. Ctr.* 20(2):170-174, 1968.

3349 **CURRENT POINTS OF VIEW ON THE TREATMENT OF PANCREATITIS AND RELATED DISEASES.** *(Rev.)(Ger.)* Kyrle, P. (Rudolf Found. Hosp., Vienna, Austria). *Wien. Med. Wschr.* 118(20/21):454-459, 1968.

3350 **CYSTIC PANCREATITIS DUE TO STEROIDS IN A CASE OF APLASTIC ANEMIA.** *(Ger.)* Wolfmuller, H. (Inst. Pathol., Munic. Hosp., Karlsruhe, Germany). *Deutsch. Med. Wschr.* 93(24):1180-1183, 1968.

3351 **THE INTERRELATIONS BETWEEN ACUTE PANCREATITIS AND DIABETES MELLITUS.** *(Rus.)* Akzhigitov, G. N. (I. M. Sechenov 1st Moscow Med. Inst., USSR) and T. A. Strygina. *Klin. Med. (Moskva)* 46(4):70-77, 1968.

3352 **EARLY PANCREATECTOMY IN ACUTE NECROTIC PANCREATITIS.** *(Fr.)* Colin, R. (St. Eloi Hosp., Montpellier, France), H. Lapeyrie and J. Dossa. *Mem. Acad. Chir.* 94(14/15):437-443, 1968.

3353 **ACUTE PANCREATITIS: A "MAJOR SYMPTOM" HISTORY.** *(Ger.)* Krebs, M. (Med. Clin., Tubingen U., Germany), W. Kaufman and H. J. Betzler. *Med. Welt.* 19(30):1679-1680, 1968.

3354 **EXPERIMENTAL RESULTS OF THE USE OF THE ENZYME INHIBITOR TRASYLOL IN ACUTE PANCREATITIS.** *(Ger.)* Grozinger, K. H. (Surg. Clin., Heidelberg U., Germany). *Fortschr. Med.* 86(7):281-284, 1968.

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LIVER AND BILIARY TRACT

GENERAL

3355 EXTRAHEPATIC PORTAL HYPERTENSION: THE CLINICAL EVALUATION, INVESTIGATION AND RESULTS OF TREATMENT OF 28 PATIENTS.

(E.) Stathers, G. M. (Dept. Med., U. Sydney, Australia), M. H. Ma and C. R. B. Blackburn. *Aust. Ann. Med.* 17(1):12-19, 1968.

Twenty-eight patients (17 females, 11 males) with extrahepatic portal hypertension having initial signs or symptoms before age 19 are reviewed. Fourteen patients had histories possibly contributory to portal vein thrombosis. Gastrointestinal bleeding precipitated by salicylates, bone fragments, and pregnancy was the presenting symptom in 17 patients. All patients had splenomegaly, 1 had hepatomegaly, and 4 had transient ascites. Liver function tests were generally normal. Liver biopsies performed on 21 patients showed 10 to be normal and 19 with mild inflammatory cell infiltration of the portal tracts. All cases had esophageal varices demonstrated by X-ray and splenoportography performed in 11 patients showed extrahepatic portal obstruction in 10. Intrasplenic pulp pressures measured in 10 cases were all high. These cases showed that spontaneous portacaval shunts had developed. Splenectomy was performed as a primary procedure on 12 patients, 9 requiring future operative procedures to control bleeding, the other 3 having sporadic bleeding after many years. Spleno-renal anastomosis as a primary procedure was performed on 10 patients; 2 have had long term freedom from bleeding, and 3 required further surgery. Partial gastrectomy-esophagectomy was performed on 6 patients with previous splenectomies, 2 requiring further operations for bleeding. These results are considered satisfactory but not good enough to surgery the procedure of choice. The spontaneous development of porto-systemic shunts and the small size of the splenic vein in children are reasons to avoid surgical treatment except in hemorrhagic emergencies. The choice of surgical treatment is spleno-renal anastomosis or interruption of the gastro-esophageal venous anastomoses.

3356 INTRAVENOUS TOLBUTAMIDE-TOLERANCE TESTS IN LIVER DISEASE.

(Ger.) Avenarius, H. J. (Nordstadt Munic. Hosp., Hannover, Germany). *Deutsch. Med. Wschr.* 93(21):1059-1062, 1968.

Intravenous glucose-tolerance and tolbutamide tests were carried out on 53 patients with various diseases of the liver and 10 normal controls, 17-69 yr old, none of whom showed evidence of diabetes, in order to clarify the effect of acute (19), or chronic (4) hepatitis, cirrhosis (13), fatty liver with reactive hepatitis (5), cholestatic hepatosis with cholecystitis (7), and obstructive jaundice due to cholelithiasis (5) on carbohydrate metabolism. The tolbutamide test involves the measurement of blood glucose levels in fasting subjects after i.v. administration of tolbutamide (20 ml of 5% solution); a drop of at least 20% in the first 20 min, followed by a recovery phase lasting 60 min, is normal. Pathological results were obtained in 47 of the 53 patients, although statistically significant differences between groups could be obtained only in the cases of acute vital hepatitis and cirrhosis. The average drop in blood glucose in 20 min was 15.5% in acute hepatitis and 8.2% in cirrhosis, compared to 26.1% in controls, while that at 60 min was 34.5% in acute hepatitis and 32.8% in cirrhosis, compared to 22.7% in controls. Among the 19 with acute hepatitis, 12 were tested again after 6-8 weeks' treatment with diet and bedrest, at which time the tolbutamide test showed a definite trend towards normalization (a 20-min drop of 23.7% and a 60-min value of 26.1%); pathological blood-sugar curves were obtained in 11 of 12 before treatment and only 5 of 12 after treatment. According to the criteria of Unger and Madison (*Diabetes* 7:455, 1958), 31 of the 53 patients had "diabetic" blood sugar curves after tolbutamide, including 11 of 19 with acute hepatitis (but only 1 of 12 after treatment), 2 of 4 with chronic hepatitis, 12 of 13 with cirrhosis, and 6 of 17 others. Glucose-tolerance curves were frankly diabetic in 9 of 18 with acute hepatitis and 5 of 8 with cirrhosis, and were normal in only 4 of 18 and 1 of 8, resp. There was no clear correlation between the two tests, however, nor between the disturbance in carbohydrate metabolism and the serum glutamic-pyruvic transaminase levels in obstructive jaundice.

3357 HEPATOMA, ANALYSIS OF 42 CASES.

(Sp.) Salomon, R. (Central U. Venezuela, Gastro. Dept.), V. Lecuna T., J. Valencia-Parpaceen, A. M. Saldivia and M. Durand. *G.E.N.* 22(1):39-52, 1967.

An analysis is made of 42 patients with hepatocellular carcinoma or hepatoma, 17 diagnosed by hepatic biopsy and the rest by necropsy. There were 31 men and 11 women, with an average age of 52. The most important findings were weight loss, hepatomegaly, right hypochondrium pain, jaundice, ascites, and fever. Hepatic cirrhosis, usually of the portal type, occurred in 31 cases. Hepatic biopsy was very useful in the diagnosis of hepatoma, and laboratory examinations were useful in determining the alkaline phosphatase content which is related to cancer of the liver. The most frequent causes of death were hepatic coma and digestive and hemoperitoneum hemorrhage. Metastasis was most commonly found in the liver, lung, and regional ganglia. Seventeen cases of venous thrombosis were reported.

3358 HISTOCHEMICAL STUDY OF HUMAN LIVER ENZYMES IN CHRONIC HEPATITIS AND CIRRHOSIS.

(Rus.) Zolotarevsky, V. B. (1st Sechenov Moscow Med. Inst., USSR), S. D. Podymova and T. A. Yatsyshina. *Arkh. Pat.* 29(12):62-67, 1967.

Liver biopsy specimens from patients with chronic hepatitis and cirrhosis were studied histochemically for reactions to oxidative enzymes (succinic-, α-glycerophosphate-, lactate-, malate-, glutamate-dehydrogenase, DPN-, and TPN-diaphorase) phosphatases (acid and alkaline ATPase), RNA, protein, protein SH-groups, and glycogen. The oxidative enzymes usually have a fairly high hepatocyte activity in both conditions. In some cases of chronic hepatitis where the hepatocytes were swollen and had bright, vacuolized cytoplasm with high glycogen content, the activity of succinic-, α-glycerophosphate-, and lactate-dehydrogenase was less. In these cells, the protein granules, SH-groups, and RNA-positive staining were seen only in narrow intervacuolar spaces. The atrophied cirrhotic hepatocytes showed a greater staining intensity for proteins and SH-groups, but decreased dehydrogenase activity. The diaphorase activity in cirrhotic hepatocytes was as intense as in normal hepatocytes. The phosphatases were localized in the sinusoids (alkaline ATPase), the biliary canaliculi (acid ATPase), and in the cytoplasm of Kupffer cells (acid phosphatase). The regional distribution of succinic dehydrogenase and phosphatases showed characteristic patterns: in chronic hepatitis the enzymatic activity at the periphery of the lobule was higher than in its center; in cirrhosis, the enzymatic activity was distributed uniformly throughout the whole pseudolobule. It is suggested that the above histochemical changes reflect the functional state of hepatocytes: in cells swollen by hepatitis, the decreased oxidative enzyme activity is indicative of reduced energy requirement; the same is true of decreased succinic dehydrogenase and phosphatase activity in the center of lobules in chronic hepatitis. The decrease in hydrogenase activity in cirrhosis indicates mitochondrial lesions. On the other hand, increased alkaline phosphatase and ATPase activity in the sinusoids of the cirrhotic liver indicates an increase in metabolic turnover to compensate for cholostasis.

3359 **TREATMENT OF ACUTE ATROPHY OF THE LIVER.** *(Fr.)* Hecht, Y. (Saint-Antoine Hosp., Paris, France), P. Barbier and J. Caroli. *Acta Gastroent. Belg.* 30(8-9):551-580, 1965.

Severe jaundice due to hepatitis, viruses, or drugs found in subjects with healthy livers are discussed. A review of the literature on corticotherapy, transfusion, and coenzyme therapy indicated that only the coenzyme method was successful. This was confirmed by the authors' own experiments, in which 3 out of 8 cases of typical acute atrophy were resuscitated from a stage III or IV coma with symptoms of severe hepatocellular insufficiency. Remission in these cases was complete. Young subjects with healthy livers and delayed aggravation in hepatitis development, who are not in a deep coma, have the greatest chance for improvement.

3360 **THE PRINCIPLE OF FUNCTIONAL COMPETITION IN HETEROTOPIC HEPATIC TRANSPLANTATIONS.** *(Fr.)* Schalm, L. (Municipal Hosp. Arnhem, Netherlands). *Acta Gastroent. Belg.* 30(8-9):543-550, 1967.

A review of the literature on hepatic transplantations between 1952 and 1956 is made to determine the basis for the general failure of this operation. Two unsuccessful operations are cited and the functional competition principle is discussed. Functional competition is the situation whereby the atrophy and the hypertrophy processes are controlled by the relationship between the number of physiological possibilities at the disposition of each part of the liver (i.e., bile excretion, portal circulation, hepatic arterial circulation, and venous suprahepatic circulation). According to this principle, an auxiliary heterotopic grafted liver can survive and function only if it is in better condition than the liver of the receiver. Thus the grafted liver must have at least one additional physiological property that the receiver's own liver does not have. A successful operation was performed on 14 dogs in accordance with the functional competition principle, and the transplant continued to function in 9 of these dogs for the entire observation period of 3 weeks to 3 months.

3361 **STATISTICAL DOUBLE-BLIND STUDY OF THE EFFECT OF TOLBUTAMIDE AND A PLACEBO ON HEPATIC STEATOSES.** *(Fr.)* Sarles, H. (Ste-Marguerite Hosp., Marseille, France). *Rev. Med.* 8(29): 1499-1501, 1967.

A double blind study was performed on 26 patients with hepatic steatosis. Eleven were given Tolbutamide in a dosage of 1.50 g per day, and 15 were given a placebo. A decrease in steatosis was obtained in those patients on a balanced diet excluding alcohol. This decrease was significantly greater with Tolbutamide than with the placebo. A test to determine the effect of Tolbutamide on sulfobromophthalein retention was also performed with the result that there was no difference between sulfobromophthalein development in Tolbutamide patients and in placebo patients.

3362 **A DOUBLE-BLIND TEST OF TOLBUTAMIDE IN STEATOSIS OF THE LIVER.** *(E.)* Sarles, H. (Digestive Hosp. Saint-Marguerite, Marseille, France), R. Camatte, H. Payan and A. Gerolami. *Amer. J. Dig. Dis.* 13(1): 35-37, 1968.

The action of tolbutamide on liver steatosis was tested in 26 alcoholic patients, 11 receiving 0.5 g of tolbutamide and 15 a placebo 3 times a day for 3 weeks. Patients were clinically examined for ascites, hemorrhage and general condition. The results were statistically analyzed. Five of the 11 patients who received tolbutamide showed a major steatosis improvement, but the drug had no effect on biological disturbances, as revealed by sulfobromophthalein test results.

3363 **DIAGNOSIS AND TREATMENT OF INTRAHEPATIC ABSCESS.** *(E.)* Price, J. E. (U. California Sch. Med., Los Angeles), W. L. Joseph and D. G. Mulder. *Amer. Surg.* 33(10):820-825, 1967.

Of 30 patients between the ages of 24 and 66 years with proven hepatic abscess, 24 had a pyogenic infection and 6 an infestation with *Entamoeba histolytica.* The clinical picture was that of severe infection with generalized toxemia. Gram negative bacteremia produced prostration and shock in 4 patients; hepatomegaly was present in more than 50%. In the pyogenic group a definitive diagnosis was most often obtained with autopsy or laparotomy, while in those with *E. histolytica* infestations stool culture and liver scan were helpful. There was no mortality in the 10 patients who had surgical intervention, while 14 of the 20 receiving medical treatment died (6 had metastatic carcinoma). Most patients who died had multiple hepatic abscesses. Treatment of pyogenic hepatic abscesses consists of appropriate antibacterial therapy (keflin or tetracycline combined with kanamycin) combined with open surgical drainage. Left lobectomy may be performed in patients with large solitary lesions in the left lobe. Multiple abscesses usually cannot be drained surgically but must be treated with intensive antimicrobial therapy. Treatment of amebic abscesses consists of intesnsive and prolonged administration of amebocidal drugs (emetine and chloroquine combined with tetracycline) and aspiration or surgical drainage.

3364 **EXPERIMENTAL HEPATIC FIBROSIS WITHOUT HEPATOCELLULAR REGENERATION: A KINETIC STUDY.** *(E.)* Rubin, E. (Mt. Sinai Sch. Med., New York City), F. Hutterer and H. Popper. *Amer. J. Path.* 52(1):111-119, 1968.

This study was undertaken to ascertain whether increased hepatic cell proliferation invariably accompanies accelerated hepatic fibrogenesis; whether the hepatic lesions produced by heterologous serum administration differ functionally from other forms of experimental cirrhosis and whether criteria can be established to distinguish hepatic fibrosis from cirrhosis. Sixty Sprague-Dawley rats received i.p. injections of 0.5 ml of pig serum twice weekly and 25 controls received an equal amount of rat serum. The animals were killed at various periods ranging from 10 to 86 days. Two hours before death each animal received tritiated thymidine (^{3}H-Th), 1.0 μC/g, s.c. No morphologic alterations occurred at 16 days in rats receiving pig serum. At 30 and 44 days the portal tracts showed mild edema, and a few leukocytes and mononuclear cells were present. At 58 days most portal tracts were enlarged and stellate in cross section. Narrow fibrous septums linked portal tracts and central canals and surrounded nodules in which the parenchyma appeared undisturbed. The septums contained a few proliferated bile ductules, fibroblasts and occasional plasma cells. The appearance at 72 and 86 days was similar but fibrosis was more pronounced. The percentages of hepatocytes labeled in autoradiographs were similar in both experimental and control animals. The uptake of ^{3}H-Th into hepatic DNA showed wide variations; the mean hepatic DNA content did not differ in the 2 groups. The mean hydroxyproline content in the experimental rats remained at control levels up to 44 days but by 86 days it had reached a level 4 times that of the control. Determinations of portal pressure, sulfobromophthalein retention and SGOT activity were not significantly different in the 2 groups. The data confirm the nosologic importance of regenerative nodules in the classification of cirrhosis and suggest that such nodules are responsible for many of the functional aberrations of cirrhosis.

3365 SERUM ENZYME CHANGES AFTER HEPATIC DEARTERIALIZATION IN MAN. *(E.)* Almersjö, O. (Dept. Surg., U. Göteborg, Sweden), S. Bengmark, L. Engevik, L. O. Hafström, B. P. Loughridge and L. A. V. Nilsson. *Ann. Surg.* 167(1):9-17, 1967.

Following palliative dearterialization of the liver in 7 patients (4 men and 3 women, 51-73 yr old) with hepatic metastasis, there was an immediate sharp increase in glutamic-oxaloacetic and glutamic-pyruvic transaminase, reaching a maximum on the 1st or 2nd postoperative day (average of 2076 and 587 units, resp.) and followed by an equally rapid drop to normal levels. The serum lactic dehydrogenase and ornithine-carbamoyl transferase showed a similar response in 3 of 3 and 5 of 7 patients studied, resp.; in 2 cases there was little change in ornithine-carbamoyl transferase, and none of the 6 patients studied showed any significant changes in γ-glutamoyl transpeptidase. The alkaline phosphatase showed a slight transitory increase in 4 of 7 and no change in 3 of 7. Postoperative hyperbilirubinemia of varying duration and intensity was observed in all 7 patients, most attaining maximal values around the end of the first week. The 2 patients with the most pronounced increases had metastatic melanosarcoma and died in 24-60 days. Insufficient time has elapsed for clinical evaluation of the other 5 cases, but the importance of antibiotics and high postoperative oxygen saturation of the portal vein blood to prevent hepatic necrosis are emphasized.

3366 ROLE OF HEREDITARY FACTORS IN IDIOPATHIC, NONHEMOLYTIC, NONCONJUGATED HYPERBILIRUBINEMIA. *(Cz.)* Petera, V. (Med. Fac., Charles U., Plzeň, Czechoslovakia). *Cesk. Gastroent. Vyz.* 22(2):111-115, 1968.

Serological studies on 58 relatives of 25 patients with idiopathic, nonhemolytic, nonconjugated hyperbilirubinemia (Gilbert's disease) revealed a high incidence of familial jaundice, hyperbilirubinemia being found in 5 of 21 parents (29 parents not examined), 9 of 27 siblings (4 not examined), and 1 of 3 children (15 not examined). Eighteen of these patients had at least one relative with hyperbilirubinemia, and in the families of 7 patients hyperbilirubinemia was found in two generations, suggesting dominant heredity. Hyperbilirubinemia was also detected in 6 relatives of 4 of 5 patients with post-hepatitic hyperbilirubinemia, including the father of one patient (due to Gilbert's disease), the brother of another (also due to Gilbert's disease), the grandmother and father of a 3rd patient (Gilbert's disease), and the mother and sister of the 4th (both due to post-hepatitic jaundice). It is suggested that hereditary factors should be looked for in patients with either Gilbert's disease or post-hepatitic hyperbilirubinemia.

3367 THE LIVER IN SHOCK: A COMPARISON OF SOME TECHNIQUES USED CURRENTLY IN THERAPY. *(E.)* Hardcastle, J. D. (London Hosp., England) and H. D. Ritchie. *Brit. J. Surg.* 55(5):365-368, 1968.

Techniques used clinically in shock treatment and tissue ischemia were investigated for their effects on hypoxia and sympathetic nerve stimulation in the isolated perfused dog liver. Reducing liver blood flow and temperature to 30C decreased oxygen uptake with a subsequent increase in hepatic venous blood oxygen saturation; venous glucose did not rise in the cooled liver. Reducing blood flow and lowering the temperature to 15C did not reduce oxygen saturation below 70%; there was no potassium or glucose loss from the liver. In the control period, at 38C and with reduced blood flow, oxygen saturation decreased and the glucose and potassium content of venous blood increased. In the hypoxic liver, there was a rise in blood potassium and glucose; oxygen saturation and blood pH fell. As the hypoxic liver was cooled from 38C, pH and oxygen saturation rose, and hepatic venous blood potassium content fell after 4 min, and was lower than that of portal venous blood after 10 min; glucose loss was reduced during cooling. A rise in potassium and glucose content and a fall in pH and oxygen saturation were observed when liver blood flow was reduced after blood osmolality was raised with hypertonic sodium bicarbonate; hypertonic sodium chloride did not alter the response to reduced blood flow. Stimulation of the sympathetic nerves around the hepatic artery reduced liver potassium and glucose and increased arterial and venous blood pressure. Administration of phenoxybenzamine did not alter potassium or glucose uptake, blood pressure, oxygen saturation, or pH. Nerve restimulation increased potassium, but not glucose uptake, and restored arterial and venous blood pressure to their former levels. Hypokalemia as the cause of sudden death in hemorrhagic shock may be due to decreased liver potassium and blood pooling in the splanchnic bed in the whole animal; its role may be underestimated. Potassium loss can be prevented by hypothermia or phenoxybenzamine, but is unaffected by increasing blood osmolality.

3368 **FOCAL HEPATIC INJURY AND REPAIR PRODUCED BY LASER RADIATION: PATHOLOGIC AND BIOPHYSICAL STUDIES.** *(E.)* Fine, S. (Dept. Biophys. & Biomed. Eng., Northeast U., Boston, Mass.), J. Edlow, D. MacKeen, L. Feigen, E. Ostrea and E. Klein. *Amer. J. Path.* 52(1):155-176, 1968.

The authors produced *in vivo* focal necrosis of the liver in Sprague-Dawley rats by exposing them to laser radiation. The animals were sacrificed at periods from zero to 32 days after irradiation. Nearly all the animals sacrificed immediately after exposure showed a pink-to-grey lesion on the left lobe of the liver. At 24 hr, 2 days, and 4 days after irradiation, the lesions had become white and well-defined. In rats killed at 7 to 14 days, the lesions were similar but firmer. Only a few lesions were seen in rats killed at 32 days. The morphologic changes were consistently reproduced and fell into 3 basic patterns. The initial phase, lasting 6 days, was characterized by a cytologically inert lesion with progressive autolysis of the necrotic liver cells. The intermediate phase, from the 6th to 9th days, was characterized by the formation of capillaries and fibrous tissue at the edges of the lesion. By the end of the second week, the lesion had evolved into a fibrocalcific nodule containing multinucleated giant cells. The general morphologic picture was not specific for hepatic injury due to laser radiation.

3369 **STUDIES OF HEPATIC EXCRETORY FUNCTION. IV. BILIARY EXCRETION OF SULFOBROMOPHTHALEIN SODIUM IN A PATIENT WITH DUBIN-JOHNSON SYNDROME AND A BILIARY FISTULA.** *(E.)* Gutstein, S. (Albert Einstein Coll. Med., Bronx Municipal Hosp. Ctr., N. Y.), S. Alpert and I. M. Arias. *Israel J. Med. Sci.* 4(1):36-40, 1968.

Quantitative bile collection through a common bile duct T-tube was made in a Dubin-Johnson syndrome patient to investigate hepatic storage and biliary excretion of sodium sulfobromophthalein (BSP); the effect of sodium dehydrocholate, a synthetic bile salt derivative, on bile BSP excretion was investigated also. After an overnight fast, 13.37 mg/min of BSP was infused i.v. during the first hour and venous blood was drawn at 30, 40, 50, and 60 min; during the second hour 5% dextrose was infused, followed by another BSP infusion (5.32 mg/min). A single i.v. injection of 150 mg of BSP was given 12 hr after the second BSP infusion, and serum and bile were obtained 2, 5, 10, 30, and 60 min later; 1 hr after the injection, 10 ml of 20% sodium dehydrocholate was given i.v. and bile was collected every 7.5 min for the next 2 hr to determine BSP excretion. Transport maximum was calculated and found to be nearly zero in both studies; direct bile analysis agreed closely with calculated values; hepatic storage was 115 mg and 75 mg BSP stored/100 mg BSP in serum in the first and second study, resp. Both values are within the normal range. Biliary excretion of BSP ranged from 0.11 to 0.19 mg/min after the single dose of BSP. Sodium dehydrocholate had no effect on serum BSP. Mean bile flow increased from 5.1 to 7.3 ml/15 min, but BSP excretion was not significantly changed. The results agree with the postulate that BSP and bile salts are excreted by different hepatocellular mechanisms.

3370 **REDUCTION IN CONCENTRATION OF TOTAL SERUM BILIRUBIN IN OFFSPRING OF WOMEN TREATED WITH PHENOBARBITONE DURING PREGNANCY.** *(E.)* Maurer, H. M. (Med. Coll. Virginia, Richmond), J. A. Wolfe, M. Finster, P. J. Poppers, E. Pantuck, R. Kuntzman and A. H. Conney. *Lancet* 2(7560):122-124, 1968.

Total serum bilirubin was measured during the first 4 days of life in 12 neonates whose mothers had received sodium phenobarbitone (30-120 mg/day) for 2 weeks or more prior to delivery; 16 control babies were studied for comparison. The average maximum total bilirubin for the infants of treated mothers was 2.7 mg/100 ml, and that of controls was 5.9 mg/100 ml during the test period. The data suggest that phenobarbitone decreased neonatal serum bilirubin by enhancing hepatic enzyme activity in the fetus and newborn infant.

3371 **MESENCHYMAL HAMARTOMA OF THE LIVER.** *(E.)* Sutton, C. A. (Fitzsimons Gen. Hosp., Denver, Colo.) and J. L. Eller. *Cancer* 22(1):29-34, 1968.

The clinical characteristics, diagnosis, prognosis and treatment of mesenchymal hamartoma of the liver are discussed on the basis of 4 personal cases (2 males and 2 females, 9-15 months old) and a review of the literature (8 refs.). As is the general rule in this disease, 3 of the 4 infants were asymptomatic except for abdominal distension and a palpable abdominal mass; one had increasing constipation. The tumors were excised successfully in all 4 cases, but the 2 males died postoperatively (one due to uncontrollable bleeding and one from eventual infection following postoperative ileus and hematoma). The total number of reported cases of this benign tumor is now 22. Most of these tumors have been in the right lobe of the liver, or attached to it by a stalk. Liver function tests are rarely abnormal, and the X-ray findings resemble those in other tumors of the liver. These cystic tumors are fast-growing, but malignant degeneration has not been reported and the prognosis after surgical removal is good, especially if the tumor is attached by a pedicle.

3372 **RESOLUTION TIME OF AN AMEBIC LIVER ABSCESS.** *(E.)* Sheehy, T. W. (U. Alabama Med. Ctr., Birmingham), L. F. Parmley Jr., G. S. Johnston and H. W. Boyce. *Gastroenterology* 55(1):26-34, 1968.

Among 17 patients (16 men and 1 woman, 22-52 yr old) with amebic liver abscesses diagnosed by hepatoscanning with colloidal ^{198}Au (100 μC i.v.), in addition to the clinical symptoms and a positive response to antiamebic chemotherapy, 5 (Group I) were treated by open surgical drainage plus emetine (65 mg/day by injection for 7-10 days), chloroquine (600 mg p.o. initially followed by 300 mg/day for 20 days) and diiodohydroxyquin (650 mg p.o. 3 times daily for 10 days), 4 (Group II) were treated by needle aspiration (with removal of up to 400 ml of pus) in addition to chemotherapy, and 8 (Group III) received chemotherapy alone. The clinical symptoms (1-14 weeks duration) and laboratory findings in these patients included fever, malaise, weight loss, chills, night sweats, upper abdominal pain, hepatic tenderness, hepatomegaly, leukocytosis above 15,000/mm^3, anemia, elevated erythrocyte sedimentation rate, and elevated serum glutamic-oxaloacetic transaminase (each in at least 10 of the 17 patients). The liver scan revealed lesions varying in size from 150 to 1000 cc, localized to the right lobe only in 12 cases and bilateral in 5. The clinical response to treatment was rapid (with abatement of symptoms in 3-6 days) in 9 patients, slow in 8 patients (abatement of symptoms in 8-16 days). Serial liver scans revealed clearing of the abscess in 2-5 months (average 3.6), 2-12+ months (average 5.2) and 2-10 months (average 4.3) in the 3 treatment groups, resp. The abscess cleared in 2-4 months in 13 of the 17 cases, and the average time required was not affected by combination of chemotherapy with surgical drainage or needle aspiration. The correlation between resolution time and size of the abscess on the liver scan was also very poor. It is concluded that hepatoscanning with radioactive colloidal gold is valuable both in diagnosis and in following the effects of chemotherapy.

3373 THE EFFECT OF GLUCOSE INFUSION ON AMMONIA METABOLISM IN LIVER FAILURE.

(E.) Sy, B. G. (Cook County Hosp., Chicago, Ill.), G. Dunea, F. Steigmann and A. Dubin. *Amer. J. Med. Sci.* 256(8):91-96, 1968.

The effects of i.v. glucose infusion with and without insulin administration on blood ammonia levels were investigated in 24 liver disease patients. Although 9 patients had abnormal glucose tolerance tests, no significant changes in blood ammonia levels followed glucose infusion; insulin administration did not alter ammonia levels. Ammonium chloride administration caused a significant increase in blood ammonia. It is concluded that glucose loading has no significant effect on blood ammonia levels and no deleterious effects on the clinical state of liver disease patients.

3374 THE ORIGIN AND CHARACTERISTICS OF CEROID. *(E.)*

Maeda, R. (Kansai Med. Sch., Japan). *Acta Path. Jap.* 17(4):439-456, 1967.

Autopsy studies of 36 human fatty livers revealed no deposition of ceroid, despite the presence of large amounts of Sudan-positive fat, while 15 livers from patients with acute hepatitis (11) or cirrhosis (4), which were characterized by necrosis and fibrosis and only a few of which showed fatty degeneration, were all positive for ceroid. Ceroid deposits were also found in the brains of patients with apoplexy or encephalomalacia, and accompanying hemosiderin within numerous macrophages in the fibrous tissue around the walls of dermoid cysts. Among 690 autopsy cases, 158 (23%) showed so-called heart-failure-pigment in the lungs, and 58% of these cases also showed hemosiderin deposits. In experiments on rats, mice and rabbits, administration of various diets (deficient in vitamin E, protein or choline, and/or high in fat, lanolin or cystine) for 1-15 months, or poisoning with dimethylaminoazobenzene or CCl_4, resulted in varying degrees of both fatty degeneration and ceroid deposits in the liver, but there was very little correlation between the 2 phenomena except in mice fed a vitamin E deficient diet and rats poisoned with CCl_4. Marked deposition of ceroid in the lymph nodes was found in 94-100% of rats given dextran + iron-dextran or plasma (1.5 ml/100 g i.v. twice), while injection of erythrocyte stroma, dextran or Supamin-plus yielded moderate ceroid deposits in 86.0-93.3% of the animals, and iron-dextran or Macrodex alone produced very little ceroid. Ceroid deposits in the liver were found in 53-88% of rats or mice kept on vitamin E deficient or high-protein diets or poisoned with CCl_4, and in the lymph nodes of 91% of rats given i.v. injections of erythrocyte stroma. Among the animals with ceroid deposits, 53-100% also showed hemosiderin deposits in the same macrophages. It is concluded that ceroid formation is intimately connected with hemorrhage, necrosis and fibrosis. Ceroid is probably derived from the protein-bound phospholipids or cerebrosides in the stromal elements of phagocytosed erythrocytes, rather than being derived purely from unsaturated fatty acids. Ingested glycoprotein is apparently oxidized within the macrophages, after which it combines with unsaturated lipids to yield the characteristic Sudan-positive material.

3375 A TEN-YEAR REVIEW OF AMEBIC ABSCESS OF THE LIVER: 1956-1966. *(E.)*

Cain, G. D. (U. Texas Med. Branch, Galveston), P. Moore Jr. and M. Patterson. *Amer. J. Dig. Dis.* 13(8):709-717, 1968.

The diagnosis and treatment of amebic liver abscess are discussed on the basis of 17 male patients (23-77 yr old) encountered during a 10-yr period. The most characteristic finding in these patients was a 2-4 month history of weight loss (5-6 months in 4 cases and 5 yr in 1 case) and right pleuritic, right upper quadrant or right shoulder pain; epigastric or left upper quadrant pain was rare. Fever was present in 70% (with night sweats in 10 cases), right pleural effusion in 58% and a large tender liver in 88%; other gastrointestinal symptoms were relatively uncommon (anorexia in 7, malaise in 8, diarrhea in 3). Laboratory studies revealed leukocytosis in 82%, increased BSP retention in 82%, hypoalbuminemia in 80%, anemia in 75%, increased alkaline phosphatase in 56%, a positive liver scan in 5 of 5 tested, and positive hemagglutination tests in 2 of 2. Positive evidence of amebiasis could be obtained in only 31% of these cases. All 17 patients responded dramatically to amebicidal drugs, with a rapid decrease in fever and abatement of symptoms in a few days. The clinical picture of amebic liver abscess is sufficiently consistent and unique to suggest the correct diagnosis; which should be confirmed by scintillation scanning and by the response to attempted therapy (needle aspiration followed by chloroquine diphosphate and diiodohydroxyquin).

3376 HEPATIC ARTERY INFUSION CHEMOTHERAPY IN HEPATOMA. *(E.)*

Provan, J. L. (U. Coll. Hosp. Med. Sch., London, England), J. F. Stokes and D. Edwards. *Brit. Med. J.* 3(5614):346-349, 1968.

5-Fluorouracil (5-10 mg/kg/day in heparinized saline by i.a. infusion via the hepatic artery, total dose 6.25-14 g in 21-28 days) was used in the palliative treatment of 3 patients (male, 47-66 yr old) with inoperable primary cancer of the liver. All showed marked symptomatic improvement, with decreased pain and hepatomegaly, increased appetite, weight gain, and improvement in X-ray findings. Although one was still alive 16 months after treatment, the 2 others died in 2-4 months. There was no evidence of bone marrow depression or deterioration of liver function in any of the 3 cases, and the only complication was readily controlled bleeding at the site of catheterization in 1 case. The importance of angiography and liver scanning in controlling the proper introduction of the catheter and in evaluating the results of therapy is emphasized.

3377 INDICATIONS FOR LIVER RESECTION IN MAN AND CHANGES IN DIFFERENT LIVER FUNCTION TESTS, COAGULATION FACTORS, LIPIDS, AND PROTEINS AFTER 40 TO 80 PER CENT RESECTION.

(E.) Engevik, L. (2nd Dept. Surg., U. Göteborg, Sweden), O. Almersjö and S. Bengmark. *Epatologia* 13(3):729-742, 1967.

Based on experience with 12 patients subjected to 40-80% resection of the hepatic parenchyma, the authors report a positive correlation between postoperative hyperbilirubinemia and the extent of the resection, but not between the extent of resection and changes in serum enzyme activity. The serum bilirubin increased significantly only after 80% resection, reaching a maximum of 14 mg% in 4 days and remaining elevated for 2-3 weeks. There were transitory increases in serum glutamic-oxaloacetic transaminase, glutamic-pyruvic transaminase, lactic dehydrogenase and ornithine-carbamyl transferase (maximum 2 days postoperatively), but all enzyme levels returned to normal by 1 week. The serum prothrombin decreased slightly during the first 2 days after hepatectomy but rapidly returned to normal. The alkaline phosphatase showed no consistent change. There was a marked decrease in serum albumin, various lipid and phospholipid fractions, and coagulation factors (prothrombin, fibrinogen, proaccellerin) in some cases after surgery, but the decrease in serum albumin was readily corrected by substitution therapy. Regeneration of the liver following hepatectomy is said to take place centrally in the remaining lobe. The indications and techniques of hepatectomy and the published survival times following resection of the liver for malignant hepatoma, gallbladder cancer, metastatic liver cancer, carcinoid, and traumatic hemobilia are reviewed.

3378 ULTRASTRUCTURAL ASPECTS OF HEPATIC REGENERATION IN MAN DURING VARIOUS DISEASES OF THE LIVER.

(It.) Gentilini, P. (Inst. Spec. Med. Path., U. Florence, Italy), U. Teodori and C. Surrenti. *Epatologia* 13(3):459-472, 1967.

Electron microscopy of samples of regenerating liver tissue taken by needle biopsy from 29 patients, including 10 with acute viral hepatitis, 5 with cholestatic-cholangiolytic hepatitis, 5 with anicteric hepatitis, 6 with active chronic hepatitis and 3 with Gilbert's syndrome, revealed ultrastructural patterns recalling those encountered during experimental hepatic regeneration in rats. The findings included: hypertrophy and often displacement of the nucleolus towards the nuclear periphery; the presence of ergastoplasmic formations near the nucleus and especially in the area of the cytoplasm towards which the nucleolus has been displaced, or near the periphery of the cell in constant relation to groups of mitochondria; frequently increased density of the organelles (mitochondria and microsomes) along the nuclear or cellular membranes; and changes in the density of glycogen and agranular reticular substances in other areas of the cytoplasm. These patterns, which can be looked upon as a typical sign of effective cellular regeneration, were particularly common in icteric and anicteric viral hepatitis. The less frequent changes encountered in patients with chronic hepatitis and Gilbert's syndrome are ascribed to intracellular restructuration.

3379 EXPERIMENTAL PORTAL HYPERTENSION IN DOGS.

(E.) Talwar, J. H. (U. Kentucky Coll. Med., Lexington), W. O. Griffen Jr., and B. Eiseman. *Surgery* 64(2):429-432, 1968.

Portal hypertension in 9 dogs was produced by the injection of a dimethyl sebacate-E910 mixture directly into the portal vein via a polyethylene tube. Portal pressure measurements were taken before, immediately after, and 30 min after the injection. All animals showed an immediate increase in portal pressure from 5.6 mm Hg before injection to 11.6 mm Hg 30 min after injection. Four dogs demonstrated a slight decrease in portal pressure in 3 months; the others maintained the hypertension. Angiograms in 2 dogs at 3 months showed patchy obstruction of the intrahepatic portal system. Two dogs with subsequent portal vein-saphenous vein bypass showed reduction of portal pressure with the bypass pump operating and a prompt return to hypertensive levels when the pump was stopped. Two dogs with pressures of 11.0 and 17 mm Hg showed an immediate rise in pressure to 22 and 30 mm Hg with reinjection at 6 months after the original injection. Histologically, mild to marked reaction about the portal triad consisting of acute inflammatory changes and fibrotic repair were seen; dogs who did not sustain portal hypertension showed less reactive changes. The maintenance of sustained portal hypertension over a long period of time may require repeated injections of the acrylic monomer-dimethyl sebacate mixture.

3380 HYPERBILIRUBINEMIA AND KERNICTERUS IN GLUCOSE-6-PHOSPHATE DEHYDROGENASE-DEFICIENT INFANTS IN SINGAPORE.

(E.) Brown, W. R. (U. Singapore, Fac. Med., Malaya) and W. H. Boon. *Pediatrics* 41(6):1055-1062, 1968.

Sixty-nine newborns with glucose-6-phosphate dehydrogenase (G-6-PD)-deficiency were studied throughout the neonatal period. Seven infants (10%) required exchange transfusion or developed kernicterus. The incidence of similarly severe hyperbilirubinemia in G-6-PD-normal newborns is less than 0.3%. The G-6-PD deficient infants had hematocrit and hemoglobin concentrations slightly but significantly lower and reticulocyte counts slightly but significantly higher than in G-6-PD-normal infants. Hyperbilirubinemia in G-6-PD-deficient Chinese infants appears to result from slightly excessive hemolysis superimposed upon a moderately severe hyperbilirubinemia of a nonhemolytic type. Considerable variance of neonatal hyperbilirubinemia among ethnic groups may be influenced by their "baseline" or "physiological" hyperbilirubinemia. The early detection of G-6-PD-deficiency and close surveillance of affected newborns has substantially reduced the incidence of kernicterus associated with G-6-PD-deficiency in Singapore.

3381 PREVENTION OF HYPERBILIRUBINEMIA OF PREMATURITY BY PHOTOTHERAPY.

(E.) Lucey, J. (U. Vermont Coll. Med., Burlington), M. Ferreiro and J. Hewitt. *Pediatrics* 41(6):1047-1054, 1968.

A controlled study in a series of 111 white infants of less than

2500 g birth weight to test the effectiveness of artificial blue light in preventing hyperbilirubinemia is presented. The control group (58 infants) and the study group (53 infants) were comparable with respect to birth weight, gestational age, fluid intake, and weight loss. Coombs test positive infants were excluded from the study. Infants in the study group were placed unclothed in incubators equipped with a light chamber within the first 12 hr of life and were continuously exposed until 144 hr of age. Infants in the control group were cared for in similar incubators but were clothed. Mean serum bilirubin values (mg/100 ml) on the 1st, 2nd, 4th and 6th days for the study group were 3.4, 5.4, 5.6, and 5.3 resp., and corresponding values for the control group of 4.2, 8.3, 11.7, and 8.2 resp. A statistically significant difference between the 2 groups was evident on the 4th and 6th days (p = 0.001). No correlation between the serum albumin concentration and the response to light therapy existed. The study supplies statistically acceptable proof that light therapy can be used to prevent the development of hyperbilirubinemia of prematurity.

3382 LIVER REGENERATION AFTER MAJOR HEPATECTOMY. EFFECT OF CHEMOTHERAPY ON GROWTH AND FUNCTION–CASE REPORT.

(E.) Barrett, O. Jr. (Letterman Gen. Hosp., San Francisco, Calif.) and A. Cohen. *Cancer* 22(2):268-273, 1968.

A 64-year-old woman had an 80% liver resection for metastatic carcinoma of the gallbladder. The initial rapid drop in total serum protein, transient rise in serum bilirubin, and moderately depressed prothrombin time returned to normal within 2 months. Due to progression of the disease, a dose of 2.4 g of 5-fluorouracil over an 8 day period 7 weeks after surgery, and subsequent weekly doses of 500 mg of the drug for a total dose of 15 g has been given to date. The previously apparent metastatic nodal involvement has disappeared. Total serum protein, alkaline phosphatase, bilirubin, and the prothrombin time has remained normal. A postoperative liver scan shows marked regeneration without evidence of metastatic involvement.

3383 FROM HEPATITIS TO HEPATIC CANCER: CONSIDERATIONS AS TO ONSET, CLINICAL COURSE, AND AUTOPSY FINDINGS.

(Jap.) Kojo, Y. (Yokohama Natl. Hosp., Kanagawa, Japan), T. Fujisawa, I. Takahashi, K. Kazama, K. Maruyama, A. Hirukawa, T. Higuchi and T. Ono. *Iryo* 22(3):302-315, 1968.

Among all the admissions to the Department of Internal Medicine of Yokohama National Hospital during the period 1945-65, 6.7% had hepatic disease (acute or chronic hepatitis, cirrhosis or cancer of the liver), 4.6% had hepatitis, 1.6% had cirrhosis and 0.4% had cancer of the liver, which was a considerably higher incidence of liver disease than in Japan as a whole. Among all the autopsies performed during the same period, 9.2% revealed cirrhosis (13 cases of posthepatitic cirrhosis, 2 of postnecrotic cirrhosis and 7 of Laennec's cirrhosis) and 4.5% revealed hepatic cancer. The incidence of acute hepatitis showed a distinct peak every 5 yr (in 1954, 1959 and 1964); whereas the 50 patients admitted during 1954-55 were mostly adult males, hospitalized for 1-2 months, with a peak incidence in the summer months, the 118 patients admitted during 1956-65 included 67 males and 51 females, 49 of whom were below the age of 20, most hospitalized for 2-3 months, with a fairly constant admission rate during the year. Between 1954 and 1965, 16 males and 25 females were admitted for serum hepatitis, but 22 of these 41 admissions occurred during 1962-65; the patients were hospitalized for 1-6 months and were mostly 20-40 yr old. The incidence of cirrhosis and liver cancer showed no significant trends during 1953-65, and both diseases affected mostly adults over 40; whereas most of the 67 males and 9 females with cirrhosis were hospitalized for 1-2 months, most of the 11 males and 4 females with liver cancer survived only 1 month. Viral hepatitis was treated by means of diet, liver extracts, antibiotics, lipotropic agents, liver stimulants, corticosteroids, vitamins and glutathione. A high-protein diet (100 g protein + 35 g fat, totalling 2400 calories/day) yielded better results than a low-protein diet (80 g protein/day). Most patients were initially in positive nitrogen balance, and their basal metabolism was often 10% or more above normal; later, the development of chronic hepatitis was accompanied by disturbances in carbohydrate and protein metabolism as shown by catheterization studies. A follow-up of 67 patients treated for acute hepatitis 2-13 yr before revealed 1 death and 10 with hepatic disease; 3 (all heavy drinkers) had to be readmitted for acute hepatitis. Among other specific causes of hepatitis found during this period were drug toxicity (1 case each due to streptomycin + PAS, streptomycin alone, Brovarin, Pyramide and Wintermin), pregnancy (4 cases), viral meningitis (1 case), viral pneumonia (4 cases), hemosiderosis (2 cases), and schistosomiasis (1 case); 1 case of cirrhosis was accompanied by thrombocytopenic purpura. The diagnosis of hepatitis by means of liver function tests is discussed.

3384 THE LIVER IN SHOCK.

(E.) Hardcastle, R. D. (London Hosp., England) and H. D. Ritchie. *Brit. J. Surg.* 54(8):679-685, 1968.

The loss of potassium from the liver during shock was studied in isolated greyhound livers perfused with the dog's own blood (32% hematocrit in Krebs solution; pH stabilized with sodium bicarbonate). Hypoxia (similar to that seen in severe hemorrhagic shock) was induced either by excluding the oxygenator from the perfusion circuit (resulting in the development of progressive hypoxia with CO_2 retention over a 10-15 min period), or by reducing the perfusion flow rate while maintaining full oxygenation (resulting in faster, easily reversed, and reproducible hypoxia). When the O_2 saturation of the blood entering the liver fell below 35%, potassium was lost from the liver; glucose loss did not occur until the O_2 saturation fell below 30%. Hypercapnic mixtures (pure O_2 mixed with 35% CO_2) decreased the pH of the blood entering the liver to 6.8, but did not affect the glucose (measured by the Hugget-Nixon method) or potassium (measured by internal flame photometry) levels, and did not decrease O_2 uptake. Hepatic nerve stimulation (10 impulses/sec for 6 min) and adrenaline infusion (17.8-19.3 μg/l) elicited similar response patterns: both resulted in considerable losses of potassium and glucose from the liver without changing the O_2 concentration in the blood leaving the liver. Potassium loss was rapid and brief but glucose loss was continuous during stimulation or infusion. In view of the fact that the majority of the catecholamine released at the hepatic nerve endings during stimulation is noradrenaline (Mann and West, 1950), it is interesting to note that noradrenaline infusion had only 10% of the effectiveness of electrical or adrenaline stimulation.

3385 **JAUNDICE IN PREGNANCY.** *(E.)* Sherlock, S. (Royal Free Hosp. Med. Sch., London, England). *Brit. Med. Bull.* 24(1):39-43, 1968.

A review of studies on jaundice in pregnancy (incidence, 1/1500 gestations) is presented. Three etiological types can be distinguished: 1) jaundices peculiar to pregnancy (acute fatty liver, cholestatic jaundice, complications of pre-eclamptic toxemia and eclampsia); 2) intercurrent jaundice, affecting the pregnant woman (viral hepatitis, gallstones); or, 3) jaundice due to the effect of pregnancy on underlying liver disease. In acute fatty liver during the last trimester, jaundice, severe nausea, hematemesis, abdominal pain, stupor, and headaches occur, followed by death several days after delivery. This severe jaundice has been attributed to protein malnutrition and to depression of protein synthesis caused by certain drugs, especially the tetracyclines (which are general inhibitors of cell metabolism). Liver and renal damage and jaundice result; the chief necropsy finding is fine drops of fat in the liver cells throughout the lobules. Moderate increases in serum transaminase and alkaline phosphatase levels distinguish this jaundice from viral hepatitis. Treatment is symptomatic for hepatic and renal failure, and the prognosis is very poor. In mild recurrent intrahepatic cholestatic jaundice, pruritus is the only complaint present. Jaundice is rarely deep; the urine is dark and the stools pale. The liver and spleen are impalpable. After delivery, the pruritus ceases and the jaundice disappears within 1-2 weeks. The prognosis is excellent, but the condition recurs with subsequent pregnancies. Oral contraceptives should not be given to patients who have had pruritus in pregnancy, for icteric reactions can be expected. The jaundice of pre-eclampsia and eclampsia is the hemolytic type and is often terminal. The commonest cause of intercurrent jaundice in pregnancy is viral hepatitis which runs the same course as in the nongravid. There is no increased hazard to the mother nor risk to the fetus, so that pregnancy should not be terminated. The clinical picture for gallstones does not differ from the nongravid condition, and management should be similar. Drugs causing jaundice affect pregnant and nonpregnant women similarly, but the effects on the newborn must be considered. The coincidence of liver disease and pregnancy should not indicate termination of the pregnancy, and spontaneous delivery is to be expected.

3386 **BLOOD EXCHANGE IN THE TREATMENT OF HEPATIC COMA.** *(E.)* Berger, R. L. (St. Elizabeth's Hosp., Brighton, Mass.), J. R. Stanton, R. M. Liversage, D. M. McGoldrick, J. H. Graham and F. Stohlman Jr. *JAMA* 202(4):267-274, 1968.

The treatment of acute fulminating hepatitis by exchange transfusions to allow liver cell regeneration is presented in 7 case histories (3 patients regained consciousness, 2 became long term survivors, 1 died of cerebral ischemia and 1 died of septicemia). Exchange transfusions via 1/8" tubing into the vena cava (first choice for cutdown was the median basilic vein; second choice was a major branch of the femoral vein) were accomplished by serial infusions (500-1000 cc whole blood) and withdrawals (500 cc). To establish optimal circulating blood volume, blood was infused until a central venous pressure of 10 cm was reached. In a 70 kg man, a 6000 cc exchange replaces about 80% of the initial blood volume. If the lethal factor is restricted to the vascular compartment, an exchange of 12 U is sufficient. In cases requiring several exchanges, the tubing should be removed at the end of each exchange and a small polyethylene catheter left in place until the next exchange, in order to prevent clotting along the catheter (as occurred in one patient). Fresh blood treated with sodium heparin was used since it provides missing clotting factors, avoids citrate intoxication, and has lower ammonia concentration than banked blood. Glutamic acid hydrochloride, intestinal antibiotics, steroids, and growth hormone (the last of doubtful efficacy) were also administered. Peritoneal dialysis was combined with the exchange transfusion even in the absence of renal failure. Biochemical changes (reduction of serum bilirubin, transaminase, alkaline phosphatase and increase in prothrombin activity and fibrinogen levels) do not necessarily imply improvement in the clinical state, but do indicate the extent of exchange of the measured substances and the degree of washout of toxic metabolites. Such clinical improvements as did occur were more subtle than biochemical changes; the patients tended to slip into and out of coma. The 2 patients who responded to treatment showed regeneration of liver cells. The exchange procedure is considered safe enough for critically ill patients; there is a 4% probability of hepatitis after each 10 U exchange.

3387 **ULTRASTRUCTURAL STUDIES IN ALCOHOLIC LIVER DISEASE.** *(E.)* Klion, F. M. (Mount Sinai Sch. Med., New York City) and F. Schaffner. *Digestion* 1(1):2-14, 1968.

To distinguish hepatic ultrastructural abnormalities in alcoholic liver disease patients and normal individuals given alcohol, to ascertain the role of the mesenchymal response in hepatocellular damage, and to investigate the mechanisms producing hepatocellular necrosis and fibrosis, liver biopsy specimens from 6 patients with alcoholic hepatitis without cirrhosis, 11 with alcoholic hepatitis with cirrhosis, and 1 with inactive cirrhosis were examined by light and electron microscopy. Specimens from acute alcoholic hepatitis patients revealed abnormal mitochondria, vesiculated endoplasmic reticulum with lacunar dilatation , abundant glycogen particles without membranes, dilated rough endoplasmic reticulum with detached ribosomes, and more and enlarged microbodies with coarsely granular matrices; dilatation and loss of canalicular microvilli, thickened pericanalicular ectoplasm and prominent Golgi apparatuses were also observed. Enlarged lipid droplets and dispersed electron dense particles were seen in Kupffer cells; polymorphonuclear leukocytes and lipocytes were noted in sinusoids and tissue spaces, resp. The same changes, with disturbed spatial orientation of hepatocytes, were observed in specimens from patients with alcoholic hepatitis with cirrhosis; Disse spaces were widened by collagen fibrils, and fibroblasts and large macrophages were seen in portal areas. Mitochondrial membrane abnormalities, the presence of alcoholic hyaline, and the leukocytic and fibroblastic mesenchymal response suggest that alcoholic liver disease was more than an extension of the effect of alcohol alone. These changes appear to contribute to further hepatocellular damage.

3388 **REVERSIBILITY OF THE ERYTHROCYTE LIPID ABNORMALITIES IN HEPATIC**

DISEASE. *(E.)* Neerhout, R. C. (U. C. L. A. Sch. Med., Los Angeles, Calif.). *J. Pediat.* 73(3):364-373, 1968.

Five patients with reversible forms of liver disease and abnormalities of erythrocyte stromal lipids showing reversion of these abnormalities as liver function improved are described. The total lipid, cholesterol, and phospholipid content of red cell stroma were determined. The abnormalities seen during the acute phase of the liver disease were an increased percentage of phosphatidyl choline in all patients, and an increase in total membrane lipid in 3 patients. Improvement in the lipid pattern appeared to follow the improvement of liver function more closely than the changes in the plasma lipids. Target cells were noted; these disappeared as the stromal lipids returned to normal. Whether these abnormalities are secondary to the altered plasma environment in liver disease or reflect a more direct control of membrane lipid by the liver is unclear.

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3473 **THE LIVER IN OLD AGE.** *(Fl.)* Verselder, R. (St. Maria Hosp., Antwerp, Belgium), H. J. de Cock and N. Buyssens. *T. Gastroent.* 11(1):52-60, 1968.

3474 **PORTAL HYPERTENSION IN A CASE OF ACUTE LEUKEMIA TREATED WITH ANTIMETABOLITES FOR TEN YEARS.** *(E.)* Lascari, A. D. (U. Iowa Hosp., Iowa City), R. L. Givler, R. T. Soper and L. F. Hill. *New Eng. J. Med.* 279(6):303-306, 1968.

3475 **TREATMENT OF THE SO-CALLED HEPATORENAL SYNDROME.** *(Rev.)(Ger.)* Klütsch, K. (Med. Clin., U. Wurzburg, Germany). *Deutsch. Med. Wschr.* 93(24):1200-1202, 1968.

3476 **PRELIMINARY DATA ON THE PRODUCTION OF ANTIBODIES BY CHRONIC ALCOHOLICS.** *(It.)* Bertini, F. (Psychiat. Hosp., Turin, Italy). *Epatologia* 13(5):1127-1128, 1967.

3477 **HEPATITIS IN DENGUE-FEVER.** *(E.)* Munasinghie, D. R. (Dept. Med., U. Ceylon, Colombo) and K. Rajasuriya. *Ceylon Med. J.* 12(4):222-224, 1967.

3478 **THE ROLE OF ELECTRON MICROSCOPY IN EXAMINATION OF THE LIVER IN ALCOHOLIC LIVER DISEASE.** *(E.)* Schaffner, F. (New York, N. Y.). *Digestion* 1(1):59-60, 1968.

See also abstract nos.: 2751,2890,2891,2900,2915,2920,2944,2992,3365

3479 THE RAT PLASMINOGEN SYSTEM, INTRAHEPATIC FIBRINOLYSIS AND CARBON TETRACHLORIDE HEPATOTOXICITY.

(E.) Innerfield, I. (Biochem. Dept., Fairleigh Dickinson U., Teaneck, N. J.), G. R. Rowley, P. Zweil and J. Porpora. *Thromb. Diath. Haemorrh.* 18(3-4):447-455, 1967.

Female Wistar rats (in groups of 20) were injected s.c. with 0.005 or 0.1 ml/100 g body weight of a mixture containing equal (1:1) parts of carbon tetrachloride (CCl_4) and mineral oil, and then given orally 1,000 or 10,000 U streptokinase or 5 and 50 mg of the following enzymes: trypsin, bromelin, papain, chymotrypsin and *Aspergillus oryzae* protease. Twenty-four hours after the CCl_4 administration, the rats were killed and their livers excised and prepared for histological examination. Fibrinolytic activity of liver homogenates was determined from the caseinolytic and clot lysis activities. The small dose of CCl_4 alone or in combination with the small doses of streptokinase or trypsin, as well as with small or large doses of all other enzymes, had no toxic effect on the hepatocytes. However, marked toxicity in the form of necrosis was found to occur after the large dose of CCl_4 alone (100% cases) and after the small dose of CCl_4 given in combination with the large dose of streptokinase (85%) or trypsin (80%). The small doses of both streptokinase and trypsin showed a marked protective effect against the hepatotoxicity of CCl_4. The clot lysis time in the rats treated with the small doses of CCl_4 alone, streptokinase alone, or trypsin alone was more than 48 hr and did not differ from the clot lysis time in untreated control rats. The clot lysis time after the large dose of CCl_4 alone, was 12 hr and after the small dose of CCl_4 given in combination with the large dose of streptokinase was 15 hr. In a group of rats where the small dose of CCl_4 and the large dose of streptokinase were followed by i.p. injection of 1 ml of epsilon-amino caproic acid, clot lysis time was more than 48 hr. Caseinolytic activity (μg of tyrosine/mg dry liver/hr) in untreated rats and in CCl_4-, streptokinase- and trypsin-treated rats (small doses) were 0.096, 0.103, 0.083 and 0.088. The corresponding values for the groups treated with the large dose of CCl_4 alone, small dose of CCl_4 + large dose of streptokinase and with small dose of CCl_4 + large dose of streptokinase + epsilon-amino caproic acid were 1.160, 1.099, and 0.074. It is suggested that hepatocyte damage, intrahepatic fibrinolysis, and plasminogen activation are related phenomena. The plasminogen is released from the hepatocytes damaged by CCl_4. The protective effect of streptokinase and trypsin is related to their coagulation potentiating, permeability decreasing, and edema decreasing effects.

3480 HEPATIC CHANGES PRODUCED BY A SINGLE DOSE OF ENDOTOXIN IN THE GERMFREE MOUSE: HISTOCHEMISTRY, LIGHT MICROSCOPY, FLUORESCENCE MICROSCOPY AND ELECTRON MICROSCOPY.

(E.) Levy, E. (Johns Hopkins U. Sch. Med., Baltimore, Md.) and B. H. Ruebner. *Amer. J. Path.* 52(1):97-110, 1968.

The authors compared the hepatic morphologic changes produced by endotoxin in germ-free mice and in pathogen-free animals of the same strain (described in an earlier study). A total of 20 axenic female CD_1 mice were divided into 3 groups. Group I, consisting of 12 animals, received i.p., 700 μg of lipopolysaccharide *E. coli* suspended in 0.1 ml of sterile pyrogen-free water. The 6 animals in Group II received 0.1 ml of sterile pyrogen-free water, i.p. Two additional animals, Group III, received no injections. The mice were killed ½ hr to 24 hr after injection. The studies of germ-free and pathogen-free mice showed substantial agreement. After endotoxin there was a rapid reduction in glycogen in germ-free mice which contrasted with the rapid diffuse depletion in the pathogen-free animals. Stains for fat and fibrin in the control animals and in animals after endotoxin injection were negative; moderate fatty change had developed at 24 hr in pathogen-free mice. Specific fluoresence was not seen in the control animals. In the other groups after ½ hr occasional granules of specific green fluoresence appeared in the sinusoids. At 4 hr there was a dramatic increase in sinusoidal specific fluoresence. The hepatic ultrastructure showed only minor differences between germ-free, pathogen-free and conventional mice.

3481 HEPATIC INJURY ASSOCIATED WITH TROMETHAMINE.

(E.) Goldenberg, V. E. (Dept. Path., U. Washington, Seattle), L. Wiegenstein and G. B. Hopkins. *J.A.M.A.* 205(2):81-84, 1968.

One hundred complete autopsies on newborn infants with idiopathic respiratory distress syndrome with respiratory acidosis were studied to find the histological effects of tromethamine and sodium bicarbonate buffer treatment; 67 patients had received tromethamine and bicarbonate treatment, and the rest received bicarbonate buffer treatment alone. Tromethamine doses ranged from 3-90 cc of 1.2 M solution and bicarbonate buffer doses varied from 2-34 mEq. Irregular hemorrhagic liver areas were found in 9 of the 67 patients given both tromethamine and bicarbonate buffer; 5 had partly organized liver thrombosis and 5 had mural thrombi in the hepatic vein. Mural thrombi were also found in the umbilical vein of one patient. Hepatic necrosis was seen in 22 of the patients receiving the combined treatment. Damage was moderate through diffuse, ranging from periportal hemorrhage to massive infarction. All 22 infants with liver necrosis had tromethamine and bicarbonate buffer injected via the umbilical vein. None of the infants given the combined treatment via the umbilical artery displayed hepatic lesions. The severity and extent of liver damage could not be correlated with tromethamine dosage, or the length of infant survival. Infants given only bicarbonate buffer showed no vascular, hepatic, or pulmonary lesions irrespective of the route of administration. Liver lesions did not contribute to the infant deaths, although the side effects of tromethamine deserve more attention and further investigation.

3482 BROMSULFONPHTHALEIN ELIMINATION FROM THE BLOOD AND THE ACTIVITY OF GLUTAMIC-OXALOACETIC AND GLUTAMIC-PYRUVIC TRANSAMINASE IN THE SERUM AND LIVER HOMOGENATES FROM IMMATURE AND ADULT RATS AFTER PRETREATMENT WITH CCl_4 OR BARBITURATES.

(Ger.) Klinger, W. (Inst. Pharmacol., Friedrich-Schiller U., Jena, Germany), D. Müller, R. Tiller and G. Rudolph. *Arch. Toxik.* 23(3):167-177, 1968.

In male and female Wistar rats (either 10-13 or 120-140 days old), poisoning with CCl_4 (0.5-2.0 ml/kg i.p.) resulted in increased serum transaminase activity and decreased clearance of BSP (50 mg/kg i.p. or intracardially), but no change in transaminase activity in liver homogenates. Barbital (150 mg/kg/day i.p. x 3) or phenobarbital (60 mg/kg/day i.p. x 3), on the other hand, stimulated BSP clearance and resulted in increased transaminase activity in liver homogenates, with no effect on serum transaminase levels. It is concluded that these doses of barbiturates do not produce liver damage in rats; in fact, they seem to stimulate the induction of liver transaminases and enzymes contributing to the metabolism of BSP. Liver transaminase activity was also increased after fasting for 12-72 hr, and in such animals additional barbiturate treatment had no effect; it is therefore still not clear whether the effect of barbiturates is a direct one or actually an effect of depression of food intake. After i.p. injection of BSP in normal adult rats, almost none of the dye appears in the general circulation. This hepatic clearance mechanism for BSP is not fully developed in infant rats, but CCl_4 poisoning still results in higher BSP levels in the peripheral circulation.

3483 CHANGES IN THE METABOLISM OF PHENAZON, AMINOPHENAZON AND CODEINE AS A SIGN OF EARLY DAMAGE TO THE RAT LIVER AFTER ADMINISTRATION OF CARBON TETRACHLORIDE.

(Ger.) Klinger, W. (Inst. Pharmacol., Friedrich-Schiller U., Jena, Germany), A. Neugebauer and F. K. Splinter. *Arch. Toxik.* 23(3):178-185, 1968.

In adult male Wistar rats, administration of CCl_4 (0.5 ml/kg i.p.) produced rapid inhibition of phenazine hydroxylation and aminophenazone N-demethylation by rat liver supernatant *in vitro* (50% inhibition 10 min after administration of CCl_4, using the supernatant of a liver homogenate prepared in 1.15% KCl, pH 7.4, and centrifuged at 9000 g for 20 min). Phenazone hydroxylation increased again 20 min after administration of CCl_4 and reached normal values in 90 min, but then decreased again 180 min after CCl_4. The N-demethylation of aminophenazone increased towards normal values 60 min after CCl_4, but also dropped again at 180 min. The O-demethylation of codeine, on the other hand, which was unaffected 10 min after CCl_4 administration, decreased steadily thereafter and remained definitely subnormal after 180 min. Addition of CCl_4 to the incubation mixture *in vitro* in concentrations up to 0.8 mg/ml (more than 10 times that expected in the liver homogenate from *in vivo* administration at the dosage used) had no significant inhibitory effect on any of the 3 reactions, while at 0.08 mg/ml (approximating the maximal concentration reached *in vivo*), CCl_4 produced a slight increase in the speed of all 3 reactions. The *in vivo* effects of CCl_4 on hepatic drug metabolism can therefore not be explained by the direct *in vitro* effects of the poison.

3484 THE EFFECT OF CHRONIC OCCUPATIONAL EXPOSURE TO ALLYL CHLORIDE. *(Ger.)*

Häusler, M. (Factory Clin., VEB Leuna Plant "Walter Ulbricht", Leuna, Germany) and R. Lenich. *Arch. Toxik.* 23(3):209-214, 1968.

Among 60 industrial workers (45 men and 15 women) exposed to increased concentrations of allyl chloride in the ambient air (up to 113 ppm) for 16 months, repeated liver function tests showed a definite increase in the serum levels of both cytoplasmic (lactic dehydrogenase and glutamic-pyruvic transaminase) and mitochondrial (glutamic dehydrogenase) liver enzymes, along with other signs of mild liver damage. Thymol turbidity became positive in 10 cases, the cadmium test became positive in 7, 10 showed increases in total serum bilirubin (urobilinogen was also increased in 5), and abnormal levels of serum lactic dehydrogenase, glutamic-oxaloacetic transaminase, glutamic-pyruvic transaminase, sorbitol dehydrogenase and glutamic dehydrogenase were noted in 12, 5, 25, 21 and 25 cases, resp. Twenty workers also complained of a distinct odor of garlic on their breath. There was no palpable hepatomegaly, and headache and nausea were rare. All liver function tests returned to normal rapidly (maximum 6 months) after exposure to allyl chloride ceased.

3485 FALSE-POSITIVE LIVER SCANS IN PATIENTS WITH ALCOHOLIC LIVER DISEASE. *(E.)*

Klion, F. M. (The Mount Sinai Hosp., New York City) and A. Z. Rudavsky. *Ann. Intern. Med.* 69(2):283-291, 1968.

Six patients with presumptive diagnoses of cirrhosis whose clinical course suddenly deteriorated suggesting the presence of a primary or secondary hepatic carcinoma were studied. Two patients had laboratory abnormalities suggestive of a superimposed hepatoma. Hepatic scintoscans were performed with radioactive colloidal gold (^{198}Au). Percutaneous liver biopsies were performed with a Menghini needle directed into an area corresponding to a "cold" area on scan. The liver scans of each patient showed discrete areas of decreased isotope uptake. Needle biopsies of the liver performed in "cold" areas of each patient unexpectedly revealed a fatty cirrhosis rather than neoplasia. Since both cirrhosis and a metastatic carcinoma may coexist in the same patient, percutaneous liver biopsy directed into the "cold" area is necessary to confirm the presumptive diagnosis and preclude an unwarranted poor prognosis or unnecessary surgical intervention.

3486 HEPATIC ANGIOGRAPHY IN "ALCOHOLIC HEPATITIS." *(E.)*

Rourke, J. A. (Boston City Hosp., Mass.), M. A. Bosniak and E. J. Ferris. *Radiology* 91(2): 290-296, 1968.

Similar findings in selective celiac arteriograms in 4 cases of florid "alcoholic hepatitis" are reported and compared to the angiographic manifestations of hepatic neoplasms. Marked dilatation of the common hepatic and intrahepatic arteries was noted, with occasional extreme hypervascularity in the parenchymous structures of the upper abdomen. Pronounced stretching, displacement, and elongation of hepatic arteries with increased filling to the terminal ramifications was seen. As is consistent with benign disease, slightly more regularity of pattern and progressive attenuation of vessel caliber was noted in the patients studied, as contrasted to the irregularity of pattern and abrupt caliber changes seen in malignant disease. The use of epinephrine, by its diffuse intrahepatic vasoconstrictive effect, is helpful in differentiation of benign from malignant disease.

3487 CIRCULATING IRON-CONTAINING MACROPHAGES IN HEMOCHROMATOSIS.

(E.) Yam, L. T. (New England Med. Ctr. Hosps., Boston,

Mass.), H. E. Finkel, L. R. Weintraub and W. H. Crosby. *New England J. Med.* 279(10):512-514, 1968.

The role of iron-containing macrophages in iron transport from one organ to another was studied in blood specimens from 6 healthy subjects, 9 hemochromatosis patients, and 20 patients with various iron-storage diseases; plasma concentration and iron-binding capacity were determined in all patients. No iron was found in mononuclear leukocytes of the normal subjects; 8 of the 9 hemochromatosis patients had 2-36 iron-containing cells per 10,000 mononuclear leukocytes. The blood of only 4 of 20 patients with iron-loading diseases contained iron-positive leukocytes; these patients were diagnosed as having severe transfusional siderosis. Bone marrow erythroid activity did not correlate with the presence of iron-containing cells. Hemosiderin granules are few and small in the iron-containing cells in hemochromatosis patients, as opposed to the large confluent granules found in transfusional siderosis patients. Further investigation is needed to determine whether the type and number of iron-containing leukocytes in the blood buffy coat are significant in diagnosing iron-storage diseases.

3488 ELECTRON MICROSCOPY OF HEPATIC CELL LESIONS INDUCED BY ELECTRODUCTION. *(E.)* Schoefield, B. H. (Res. Lab., Edgewood Arsenal, Md.) and I. W. Grossman. *Arch. Path.* 86(2):208-213, 1968.

Intracytoplasmic liver cell vacuolization was produced in 5 goats fatally electrocuted with 120 +5 v, 60 cycles per second alternating current. Three goats killed by i.v. pentobarbital did not show cytoplasmic vacuolization. Magnesium-dependent adenosine triphosphate activity associated with plasma membranes was localized by ultrastructural cytochemistry to the vacuolar membranes, supporting the pinocytic origin of these vacuoles. The vacuoles are morphologically similar to those produced by hypoxia, ischemia, and portocaval shunt. Alteration of the electrical resistance of the plasma membrane by the lethal electrical current is suggested as a probable explanation for the observed pinocytic activity.

3489 STUDIES ON THE PATHOGENESIS OF LIVER NECROSIS BY α-AMANITIN: EFFECT OF α-AMANITIN ON RIBONUCLEIC ACID SYNTHESIS AND ON RIBONUCLEIC ACID POLYMERASE IN MOUSE LIVER NUCLEI. *(E.)* Stirpe, F. (Inst. Gen. Path., U. Bologna, Italy) and L. Fiume. *Biochem. J.* 105(2):779-782, 1967.

3490 BIOCHEMICAL CHANGES IN PLASMA MEMBRANES ISOLATED FROM LIVERS OF RATS TREATED WITH DIMETHYLNITROSAMINE. [ORAL COMMUNICATION; MEETING OF BIOCHEM. SOC., SEPT. 21-22, 1967, BRISTOL, ENGLAND] *(E.)* Le Page, R. N. (Med. Res. Council Labs., Carshalton, Surrey, England) and W. H. Butler. *Biochem. J.* 105(3):18P, 1967.

3491 PERFUSION OF THE ISOLATED LIVER IN THE RAT: APPLICATION TO THE STUDY OF TOXIC SUBSTANCES AFFECTING THE LIVER. [ORAL COMMUNICATION; RESEARCH FORUM, PARIS, SEPT. 30, 1967] *(Fr.)* Infante, R. (St. Antoine U. Hosp. Ctr., Paris, France), V. Schwarzmann, A. Raisonnier and J. Caroli. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):95, 1968.

3492 IMPAIRED SECRETION OF TRIGLYCERIDES BY THE LIVER; A CAUSE OF TETRACYCLINE-INDUCED FATTY LIVER. *(E.)* Hansen, C. H. (U. Texas Southwest. Med. Sch., Dallas, Tex.), L. H. Pearson, S. Schenker and B. Combes. *Proc. Soc. Exp. Biol. Med.* 128(1):143-146, 1968.

3493 ALCOHOLIC DRINKING HABIT AND HEPATIC DAMAGE. *(E.)* Viel, B. (Sch. Med., U. Chile), S. Donoso, D. Salcedo and A. Varela. *J. Chron. Dis.* 21(3):157-166, 1968.

3494 SEVERE LIVER INJURY. *(E.)* Allcock, E. A. (Royal Melbourne Hosp., Australia). *Aust. New Zeal. J. Surg.* 37(4):406-409, 1968.

3495 FATTY LIVER, PATHOGENESIS AND CLINICAL SIGNIFICANCE. *(E.)* Berg, G. (Med. Dept. Erlangen-Nurnberg U., Germany). *Digestion* 1(1):61-64, 1968.

3496 BEHAVIOR OF ATP, ADP AND AMP IN MOUSE LIVER FOLLOWING EXPERIMENTAL CCl_4 POISONING AND SUBSEQUENT ADMINISTRATION OF GLUCOCORTICOIDS. *(Ger.)* Göggel, K. H. (2nd Med. Clin., U. Frankfurt am Main, Germany). *Epatologia* 13(5):973-976, 1967.

3497 A STUDY OF THE EFFECT OF HYPOXANTHINE RIBOSIDE IN THE ALBINO RAT WITH HEPATIC STEATOSIS OR TOXIC HEPATITIS. *(Fr.)* Gajdos, A. (Med. Clin., Hotel-Dieu, Paris, France). *Epatologia* 13(5):985-990, 1967.

3498 EXPERIMENTAL POTENTIATION OF PHENOTHIAZINE TOXICOLOGY. I. EFFECT OF LIVER DISORDERS. *(E.)* Roizin, L. (Bronx State Hosp., New York City), G. Gold, M. A. Kaufman, R. Fieve, G. Alexander, V. Ueno, J. Liu, S. Keoseian and R. Gray. *Agressologie* 9(2):379-381, 1968.

3499 THE ACTIVITY OF THE BLOOD PLASMA ENZYMES IN RATS IN VARIOUS TYPES OF ACUTE TOXIC LESIONS OF THE LIVER. *(Rus.)* Pokrovskii, A. A. (2d Pirogov Moscow Med. Inst., USSR), A. I. Archakov, A. M. Gerasimov, I. I. Karusina and M. L. Sorokina. *Biull. Eksp. Biol. Med.* 65(5):60-63, 1968.

3500 STUDIES OF THE INTESTINAL ABSORPTION OF THIAMINE, RIBOFLAVIN AND CALCIUM IN LIVER DAMAGE. *(E.)* Miyao, M. (Sch. Med., Tokushima U., Japan), H. Matsuda, T. Usui, H. Tanaka, T. Kochi and Y. Yamagata. *Tokushima J. Exper. Med.* 14:1-12, 1967.

3501 THE EFFECT OF LIVER INJURY DUE TO CARBON TETRACHLORIDE INTOXICATION OF THE COLLAGEN CONTENT OF GRANULATED TISSUE IN THE RAT. *(Cz.)* Weissova, J. (Res. Inst. Rheumatic Dis., Prague, Czechoslovakia), J. Musil and M. Adam. *Cas. Lek. Cesk.* 107(9):274-276, 1968.

3502 **ALCOHOLIC LIVER DAMAGE AND PORTAL HYPERTENSION.** *(It.)* Bevilacqua, G. (U. Polyclin., Milan, Italy), G. Gallioli and F. Rocca Gasparro. *Epatologia* 13(5):1121-1126, 1967.

3503 **ALCOHOL AND LIVER PARENCHYMAL CHANGES: CLINICAL AND EXPERIMENTAL OBSERVATIONS.** *(Ger.)* Čerlek, S. (Med. Fac., U. Zagreb, Yugoslavia), V. Hudolin, M. Kneževič, S. Forenbacher, N. Lang and N. Čerlek. *Epatologia* 13(5):1105-1110, 1967.

3504 **ARE REGENERATION NODULES RESPONSIBLE FOR THE PORTAL HYPERTENSION ACCOMPANYING ALCOHOLIC CIRRHOSIS OF THE LIVER?** *(Fr.)* Bertrand, L. (St. Eloi Hosp., Montpellier, France) and H. Michel. *Epatologia* 13(3):581-596, 1967.

3505 **ULTRASTRUCTURAL CHANGES IN RAT LIVER DURING DL-ETHIONINE INTOXICATION.** *(It.)* Melis, M. (Inst. Anat. & Path. Histol., U. Rome, Italy) and L. Orci. *Fegato* 13(4):437-455, 1967.

3506 **DRUGS AND THE LIVER.** *(E.)* Sherlock, S. (Royal Free Hosp., U. London, England). *Brit. Med. J.* 1(5586):227-229, 1968.

3507 **β-GLUCURONIDASE IN CHRONIC CARBON TETRACHLORIDE POISONING OF THE RAT LIVER.** *(Ger.)* Nilius, R. (1st Med. Clin., Martin-Luther U., Halle-Wittenberg, Germany) and F. W. Rath. *Z. Ges. Exp. Med.* 146(4):366-382, 1968.

3508 **TISSUE SELENIUM LEVELS DURING THE DEVELOPMENT OF DIETARY LIVER NECROSIS IN RATS FED TORULA YEAST DIETS.** *(E.)* Burk, R. F. (Dept. Biochem., Vanderbilt U., Nashville, Tenn.), R. Whitney, H. Frank and W. N. Pearson. *J. Nutr.* 95(3):420-428, 1968.

3509 **AMEBIC LIVER ABSCESS.** *(E.)* Johnson, R. L. (U. Minn. Med. Sch., Minneapolis), J. W. Rogers and H. H. Zinneman. *Amer. J. Dig. Dis.* 13(9):822-829, 1968.

3510 **JAUNDICE IN INFECTIOUS MONONUCLEOSIS.** *(E.)* Webster, S. G. P. (Royal United Hosp., Bath, England). *Brit. Med. J.* 3(5615):411-412, 1968.

3511 **REPLY TO THE PAPER BY K. MIHALECZ AND J. CSÁSZÁR ENTITLED "LIVER NECROSIS DUE TO FLUOTHAN ANESTHESIA" (ZENTRALBLATT FÜR CHIRURGIE 92:2585, 1967).** *(Ger.)* Endres, G. (Surg. Clin., U. Jena, Germany). *Zbl. Chir.* 93(22):783-785, 1968.

3512 **THE TIME COURSE OF METABOLIC CHANGES IN THE LIVER FOLLOWING EXPERIMENTAL INJURY.** *(Ger.)* Thielmann, K. (Inst. Physiol. Chem., Friedrich-Schiller U., Jena, Germany) and H. Frunder. *Epatologia* 13(2):345-352, 1967.

3513 **OBSERVATIONS ON THE EFFECT OF CCl_4 ON NORMAL AND REGENERATING LIVER.** *(Pol.)* Georgijew, A. (2d Cent. Clin. Hosp., Warsaw Acad. Med., Poland). *Pat. Pol.* 19(1):179-187, 1968.

3514 **HISTOCHEMICAL OBSERVATIONS ON HEPATIC MONOAMINOOXIDASE DURING CARBON TETRACHLORIDE INTOXICATION.** *(It.)* Pasqualino, A. (Inst. Histol. Embryol., Palermo U., Italy). *Boll. Soc. Ital. Biol. Sper.* 44(4):271-273, 1968.

3515 **EFFECTS OF ETHANOL ON OXIDATIVE DEAMINATION IN RAT LIVER SLICES.** *(E.)* Jofre de Breyer, I. J. (Pharm. Inst., Hamburg U., Germany) and K. Soehring. *Med. Pharmacol. Exp. (Basel)* 17(4):351-354, 1967.

3516 **ULTRASTRUCTURAL ASPECTS OF KUPPFER CELLS IN CARBON TETRACHLORIDE INTOXICATION IN THE RAT.** *(It.)* Melis, M. (Inst. Anat. Path. Hist., U. Rome, Italy) and L. Orci. *Fegato* 13(3):367-375, 1967.

3517 **STUDIES OF ULTRASTRUCTURAL CHANGES IN LIVER CELLS. 2: ELECTRON MICROSCOPIC OBSERVATIONS ON EXPERIMENTAL FATTY LIVER.** *(Jap.)* Funahashi, H. (Fac. Med., Kyoto U., Japan). *Jap. Arch. Int. Med.* 14(8):225-240, 1967.

3518 HEPATOCYTES AND SINUSOIDAL LINING CELLS IN VIRAL HEPATITIS. AN ELECTRON MICROSCOPIC STUDY. *(E.)* Ruebner, B. H. (Dept. of Path., The Johns Hopkins Univ. Sch. of Med., Baltimore, Maryland) and R. J. Slusser. *Arch. Path.* 86(1):1-11, 1968.

Electron microscopic changes observed in biopsies of patients with viral hepatitis are reviewed. Liver biopsies were taken from 7 patients within 2 weeks of the onset of viral hepatitis. Four patients had infectious hepatitis; the other 3 had both serum and infectious hepatitis. Biopsies from 4 subjects free from hepatic disease were used as controls. Hepatocytes showed either swelling due to dilatation of the rough endoplasmic reticulum, or increased electron opacity and indistinct organelles, resulting in one type of acidophilic body. Kupffer's cells were mainly swollen and vacuolated, occasionally containing "glycogenosomes" and lipofuscin. Necrosis of these cells was noted, resulting in increased electron opacity, presumably corresponding to hyalinization. Discontinuous basement membranes were commonly found between hepatocytes and endothelial cells. Often, the lateral cell membranes of hepatocytes showed some separation with the development of microvilli. Plugs in the bile canaliculi were most commonly of the "curlicue type," rarely consisting of crystal-line particles. Similar material was often deposited in hepatocytes and sometimes in sinusoidal lining cells.

3519 HEPATITIS IN A MAINTENANCE HEMODIALYSIS UNIT. *(E.)* Eastwood, J. B. (Charing Cross Hosp. Med. Sch., Fulham Hosp., London, England), J. R. Curtis, A. J. Wing and H. E. de Wardener. *Ann. Intern. Med.* 69(1):59-66, 1968.

An epidemic of hepatitis (probably infectious) between August 1966 and April 1967 affected 14 of 27 patients (8 men and 6 women, 21-46 yr old) under treatment with maintenance hemodialysis and one staff nurse from the general hospital wards who had not received gamma-globulin; no hepatitis developed in the staff of the maintenance hemodialysis unit (who received gamma-globulin), nor in the relatives of the patients. Eight of the 16 attacks of hepatitis (one patient developed a recurrence 62 days after recovery from the first attack) were anicteric and 3 of these were asymptomatic; one of the 14 patients died. Three of the patients had received no blood transfusions during the preceding year, the others had received an average of 2.6 U/patient-month. None of the patients who developed hepatitis had received a phenothiazine during the previous month. Dialysis was carried out twice a week for 28-32 hr/week in 3 separate patient groups, using sterilized equipment, frequently under barbiturate hypnosis. Hepatitis was diagnosed on the basis of elevated serum glutamic-oxaloacetic and glutamic-pyruvic transaminase, as well as from clinical symptoms such as fever, anorexia, nausea and vomiting, hepatomegaly and hemorrhage. Among the 10 patients on long-term anticoagulant therapy (prothrombin time maintained at 1.5 times the control value), many showed increases in prothrombin time as the first sign of hepatitis, and 3 showed hemorrhagic complications. Autopsy in the one fatal case showed intrabronchial hemorrhage and hemorrhagic necrosis of the liver. Four of the 27 patients in the unit had a history of infectious hepatitis, and all developed hepatitis again. The cases presented in groups, with intervals of 7-8 weeks and usually with evidence of contact between the patients; for example, 3 of the 4 patients dialyzed on the same night as the first case, all of whom played "Scrabble" together during dialysis, developed hepatitis 52-57 days later, this corresponding to the incubation period for infectious hepatitis. Prophylactic gamma-globulin (750 mg i.m. every 3 weeks) was given to the staff of the maintenance hemodialysis unit, to most of the remaining exposed hospital staff, and (part way through the epidemic) to the remaining patients in the unit. Although 5 patients developed hepatitis within 6 weeks after gamma-globulin, all 5 were anicteric and 2 of the 5 were asymptomatic. Among the 8 icteric patients, 4 had had no gamma-globulin, and 4 had had it 59-81 days before the attack. It is concluded that maintenance hemodialysis increases the susceptibility to normally nonpathogenic organisms, but that this susceptibility can be counteracted by prophylactic gamma-globulin and measures to prevent contact between the patients.

3520 HEPATITIS WITH MASSIVE NECROSIS (ACUTE-SUBACUTE HEPATIC DYSTROPHY): REVIEW OF THE ANATOMICAL AND CLINICAL FINDINGS IN A GROUP OF PERSONAL CASES. *(It.)* Boggiano, C. A. (Inst. Gen. Clin. Med., U. Siena, Italy), M. Gentili and G. Scalise. *Fegato* 13(4):385-412, 1967.

In 15 patients (8 men and 7 women, 21-79 yr old) with massive necrosis due to viral hepatitis seen between 1957 and 1967 (representing 4.68% of the 320 cases of histologically confirme acute viral hepatitis encountered during this period), the most characteristic histological findings were: diffuse, mostly coagulative, necrosis of the hepatocytes; collapse of the argentophilic reticular network; infiltration of histioid elements; formation of pseudo-ducts; proliferation and mobilization of the Kupffer cells; fatty degeneration and hyaline transformation of the hepatocytes; and, in some cases, hemorrhagic foci with intracellular deposition of granular bile pigment. Serial biopsies in 5 cases showed changes paralleling the clinical course. Clinically, at the time of admission, all were jaundiced (duration of 1-150 days), 10 of the 15 had fever, 13 were comatose 6 showed hypoprothrombinemia and signs of hemorrhagic diathesis, 9 were vomiting, and 12 complained of dyspepsia; only 2 of 15 had hepatomegaly, and 1 each had splenomegaly and ascites. Laboratory findings included an alkaline phosphatase of 12-52 units, a serum glutamic-pyruvic and glutamic-oxaloacetic transminase of 65-640 and 18-520 units, resp. (these 2 enzymes were subnormal in 2 terminal cases), an erythrocyte sedimentation rate of 2-64 mm (10 or above in 12 cases), a total serum bilirubin of 1.2-24.0 mg%, pathological liver function tests in most, leukocytosis in 6 of 15 cases, and an albumin/globulin ratio below 1.0 in 10 of 13 cases studied. Neuropsychiatric symptoms (somnolence, flapping tremor, psychomotor agitation, increased deep reflexes, and loss of motor coordination) were noted in 7 patients on admission, and in others later in the course of the illness. The electroencephalogram showed slowing of the basal rhythm with high-voltage delta and theta activity at 2-4 and 6-7 cycles/second, resp.; terminally, some cases showed triphasic waves of the Bickford type. Only 2 of the 15 patients recovered.

3521 **RHESUS ERYTHROCYTE AGGLUTINATION IN HEPATITIS.** *(E.)* O'Connell, C. J. (Sisters of Charity Hosp., Buffalo, N. Y.). *Amer. J. Med. Sci.* 256(1): 38-43, 1968.

Positive agglutination reactions (titers ⩾1:10) with a 1% saline suspension of rhesus erythrocytes were obtained with 15 of 20 sera from children with acute hepatitis (titers up to 1:113), 7 of 11 sera from adults with acute hepatitis (titers up to 1:90), 10 of 15 sera from patients with infectious mononucleosis, and 9 of 13 sera from patients with alcoholic liver damage. This represents an incidence of 67-71% in these diseases compared to 40.5% in normal controls, 40-50% in measles or mumps, 80% (4 of 5 cases) in serum sickness, and 4.3% (1 of 23 cases) in adult patients convalescing from acute hepatitis (2-14 months after the acute attack). In 2 of 3 hepatitis patients from whom multiple sera were obtained, the titer fell from 1:256 to 1:32 and from 1:128 to 1:32 in periods of 8 and 23 days, resp. The heterophile agglutinins found in acute viral hepatitis resemble those occasionally found in normal sera in their behavior on absorption with guinea pig kidney or beef and sheep erythrocytes. They seem to be directed specifically against sheep erythrocytes, with cross-reactivity to rhesus erythrocytes, as in the case of serum sickness. The lack of an effect of pretreatment with receptor-destroying enzyme from *V. cholerae* suggests that the antigen does not contain sialic acid. The contrast between the titers in alcoholic liver damage and those in measles and mumps suggests that the rhesus agglutinins may be the result of liver damage rather than being a nonspecific effect of viral infection.

3522 **ELECTRON MICROSCOPE STUDIES IN SERUM HEPATITIS.** *(Jap.)* Okada, K. (Nara Med. U., Japan). *Nara Med. J.* 19(2):174-188, 1968.

Electron-microscope studies of biopsy specimens of human liver from patients with serum hepatitis revealed a cytoplasm of increased density, frequently penetrating into Disse's space as a result of bleb formation; the Disse's space also frequently contained collagen fibers. In patients with hypoalbuminemia, the chromatin particles were homogeneously dispersed throughout the karyoplasm. In all cases, the cytoplasm of the hepatocytes contained many glycogen granules, characteristically organized into 400-700 Å rosettes composed of smaller granules about 200 Å in diameter. There was a decrease in the elongated form of the smooth-surfaced endoplasmic reticulum, accompanied by the appearance of vesicular forms. In cases with serum transaminase levels above 400 U, the mitochondria appeared limited by a double membrane and were characterized by the presence of a few cristae and a homogeneous matrix of intermediate density with scattered denser particles. Bile pigment appeared in the hepatocytes, regardless of the presence or absence of jaundice, and the lumen of the bile capillaries was narrowed by bleb formation through the plasma membrane. In many cases, ferritin particles 60 Å in diameter appeared in an isolated or aggregated form in the hepatocyte cytoplasm. The Golgi complex and lysosomes were found in the vicinity of the capillaries and bile pigments, suggesting that such organelles play a role in the collection, transport and secretion of bile pigments.

3523 **UNUSUAL FEATURES OF VIRAL HEPATITIS IN ACCRA, GHANA.** *(E.)* Morrow, R. H. Jr. (Dept. Prev. Med., Kampala, Uganda), H. F. Smetana, F. T. Sai and J. H. Edgcomb. *Ann. Intern. Med.* 68(6):1250-1264, 1968.

The study group consisted of 136 hospitalized patients whose diagnosis of viral hepatitis was confirmed by liver biopsy or at post-mortem examination. Histopathological examination of liver biopsy sections from these patients showed a distinctive pattern characterized by a "glandular" transformation of liver cells about bile canaliculi, an increased frequency of cholestasis, and a rarity of acidophilic bodies. Pregnant women had a higher complication rate than nonpregnant women and they had a high fetal death rate (60%). Patients in the study group had twice the frequency of erythrocyte glucose 6-phosphate dehydrogenase (G6PD) deficiency as compared with the general population, and those with the enzyme defect had a longer, more severe course. Men had a longer recovery time from equivalent degrees of liver damage than women, and older patients required a longer time than younger patients. The high acute coma and death rate was associated with immigration, shantytown residency, lower socioeconomic standing, and pregnancy. On the other hand, prolonged jaundice from hepatitis could be attributed to inherent biologic factors such as age, sex, and G6PD deficiency.

3524 **ACUTE INFECTIVE HEPATITIS. FINE STRUCTURAL AND CYTOCHEMICAL ALTERATIONS IN HUMAN LIVER.** *(E.)* Wills, E. (Middlesex Hosp. Med. Sch., London, England). *Arch. Path.* 86(2):184-207, 1968.

Needle biopsy specimens of the liver from 5 young adults with acute infective hepatitis were studied for fine structural and cytochemical changes. The most prominent alteration was dilatation of the endoplasmic reticulum of parenchymal cells. Other changes previously undescribed were the inclusion of cytoplasmic material within hepatocyte nuclei, "glycogen bodies," and alterations in the matrix density, endoplasmic reticulum, and luminal plasma membrane of biliary epithelial cells. Acid phosphatase activity was demonstrated in residual vacuolated bodies, early autophagic vacuoles, and in lysosomes. Adenosine triphosphatase (ATPase) activity of bile canaliculi varied with the presence of microvilli. ATPase activity was also seen at the plasmalemma of Kuppfer cells possessing elaborate surface foldings. ATPase activitiy of the bile ducts retained a normal distribution. Despite determined searching, virus particles were not able to be demonstrated.

3525 **ASSESSMENT OF BRITISH GAMMAGLOBULIN IN PREVENTING INFECTIOUS HEPATITIS.** *(E.)* Pollock, T. M. and D. Reid. *Brit. Med. J.* 3(5616):451-454, 1968.

A series of 87 controlled trials of the effectiveness of British gammaglobulin in preventing the clinical manifestations of infectious hepatitis is presented. Of 4103 contacts, 2050 were inoculated and 2053 served as controls. The gammaglobulin was prepared from citrated plasma pooled from more than 1000 healthy adult residents in England and Wales. Children under 10 years of age received 250 mg, those over 10 years of age received 500 mg. A 250 mg dose is equivalent to 1.7 ml of a 15 g% protein fractionation. The average duration of observation was 7 to 9 months. In the 1st 2 weeks after the inoculation, 12 of the inoculated group and 14 of the control group developed infectious hepatitis. Thereafter 6 of the inoculated group and 46 in the control group developed infectious hepatitis. The difference between the inoculated and the control groups for the entire period of observation and also when the 1st 2 weeks are excluded attains statistical significance at the 1% level.

3526 SCINTOPHOTOGRAPHY IN HEPATITIS.

(E.) Luthra, M. S. (Misericordia Hosp., Bronx, New York City), N. D. Scherl., D. Golden, M. Finkel and C. J. Collica. *Arch. Intern. Med.* 122(3):207-210, 1968.

Twenty-two patients with hepatitis were studied by gamma camera scintophotography after the intravenous administration of colloidal gold ^{198}Au. Liver scintophotos of 20 patients without liver disease were used as controls. All patients had hepatomegaly and 7 had palpable spleens. Scintophotos revealed liver enlargement in 21 patients, and a normal sized liver in 1 patient. Decreased hepatic uptake with ill-defined borders was present in all patients with increased background activity in 12 patients. No contour defects or cold areas were detected. Splenic activity was noted in 8 patients, but 2 patients with palpable spleens failed to show splenic uptake. Three of the patients exhibiting splenic activity also had bone marrow activity. The scintophotos obtainable with the gamma camera are felt to be technically superior to rectilinear scans.

3527 ANICTERIC HEPATITIS ASSOCIATED WITH AUSTRALIA ANTIGEN. OCCURRENCE IN PATIENTS WITH DOWN'S SYNDROME.

(E.) Sutnick, A. I. (Inst. Cancer Res., Fox Chase, Philadelphia, Pa.), T. London, B. S. Gerstley, M. M. Cronlund and B. S. Blumberg. *J.A.M.A.* 205(10):80-84, 1968.

The frequency of Australia antigen in patients with and without Down's syndrome in institutions of various sizes and in patients living at home and the association of the Australia antigen with elevated serum glutamic pyruvic transaminase (SGOT) levels were studied. The frequency of the Australia antigen is high in patients with Down's syndrome (27.7%) and is low in patients without this syndrome (3.2%) in large institutions. It is rare in patient's with Down's syndrome (1.5%) in small institutions and is absent in newborns and those patients not institutionalized. SGOT levels studied in sex- and age-matched groups indicated active liver cell breakdown in patients with Down's syndrome and Australia antigen. This finding was confirmed by histological evidence of hepatitis in liver biopsies from 4 of these patients. The findings are best explained by an environmental factor present in large institutions, probably infectious; and a host susceptibility factor present in patients with Down's syndrome.

3528 "POST PUMP SYNDROME" – A VARIANT OF POST TRANSFUSION HEPATITIS?

(E.) Rosenblum, R. (Montefiore Hosp. Med. Ctr., Bronx, New York City) and W. J. Heidenberg. *Arch. Intern. Med.* 122(3):204-206, 1968.

A retrospective study undertaken to evaluate the incidence of post-transfusion hepatitis and of post-pump syndrome in 200 consecutive patients undergoing cardiac surgery with the aid of extracorporeal circulation is presented. Post-pump syndrome is defined as a syndrome occurring 10 to 120 days after extracorporeal circulation is employed consisting of fever hepatosplenomegaly, and lymphocytosis with atypical lymphocytes. Post-transfusion hepatitis is defined as a viral illness occurring 10 to 120 days after open heart surgery consisting of fever, hepatomegaly and abnormalities of liver function. Clinical hepatitis with jaundice was not seen in patients under 16 years of age. Post-pump syndrome was seen in children and young adults, but not over the age of 40. The incidence of post-pump syndrome in the age group 0 to 39 years was 11.1%; the incidence of post-transfusion hepatitis in the age group 16 to 65 years was 14.8%. Post-pump syndrome may represent mild, anicteric post-transfusion hepatitis in children and young adults.

3529 EXPERIENCE WITH A HEPATITIS-FREE PLASMA PROTEIN SOLUTION.

(E.) Salsbury, A. J. (St. Bartholomew's Hosp., London, England) and M. Brozovich. *Brit. Med. J.* 3(5614):352-355, 1968.

The virus causing serum hepatitis can be inactivated by heating plasma for 10 hr at 60C, but this also denatures some of the globulins. If the heat-labile gamma-globulins are first removed (by alcohol fractionation, precipitation with polyphosphate or precipitation with ammonium sulfate in the presence of fatty acids), a stable, hepatitis-free, plasma-protein solution can be obtained which contains approximately 84% albumin and most of the alpha and beta globulins in the form of a 4.3% solution. A commercial solution of this type was used in the treatment of 33 patients (25 with acute blood loss, 4 with severe burns, and 4 with hypoproteinemia secondary to hepatic or renal disease) given 67 400-ml transfusions over a period of 18 months. The solution was clinically as effective as reconstitute dried plasma, and no serum hepatitis developed in any of the 30 patients still alive 6 months later. Out of 2 patients with cirrhosis, 1 showed a good clinical effect after 4 transfusions while 1 failed to respond and died in hepatic coma despite 5 transfusions. It is suggested that a more concentrated albumin solution would be preferable for correcting the hypoproteinemi of cirrhosis.

3530 CLINICAL OBSERVATION ON ACUTE VIRAL HEPATITIS: RELATIONSHIP BETWEEN LIVER FUNCTION TESTS AND THE PROGNOSIS.

(E.) Sokawa, S. (Med. Sch., Chiba U.). *J. Chiba Med. Soc.* 42(3):183-195, 1968.

3531 A STUDY OF THE SERUM ALKALINE PHOSPHATASE ACTIVITY IN CHILDREN WITH INFECTIOUS HEPATITIS.

(E.) Ege, B. (Ankara U., Med. Sch., Turkey). *Acta Med. Turc.* 4(1):53-63, 1967.

3532 DATA ON LIVER FUNCTION DURING CONVALESCENCE FROM VIRAL HEPATITIS.

(It.) Moreno, A. (Hosp. Maggiore, Milan, Italy), L. Pagliano-Sassi and A. Parravicini. *Epatologia* 13(5):1047-1050, 1967.

3533 **VARIATIONS IN THE IMMUNOGLOBULINS DURING VIRAL HEPATITIS.** *(It.)* Monteverde, A. (Hosp. Maggiore della Carità, Novara, Italy) and P. Aina. *Epatologia* 13(5):1055-1066, 1967.

3534 **THE SERUM IMMUNOGLOBULINS IN THE COURSE OF ACUTE HEPATITIS AND PORTAL CIRRHOSIS.** *(It.)* Grassi, B. (Inst. Spec. Med. Path., U. Pisa, Italy), C. Loni, F. Ambrogi and V. Minuti. *Epatologia* 13(5): 991-1000, 1967.

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3536 **A RAPID MICRO- AND ULTRAMICROMETHOD FOR THE DETERMINATION OF SERUM ORNITHINE-CARBAMYL-TRANSFERASE ACTIVITY IN THE DIAGNOSIS OF VIRAL HEPATITIS.** *(It.)* Ceriotti, G. (Ctr. for Tumor Study, Busto Arsizio, Italy) and A. Gazzaniga. *Epatologia* 13(5):1009-1018, 1967.

3537 **THE TOTAL ACTIVITY OF LACTIC DEHYDROGENASE AND OF ITS ISOENZYMES IN INFECTIOUS HEPATITIS.** *(Rus.)* Baklanova, G. A. (S. M. Kirov Mil. Med. Inst., Leningrad, USSR) and I. M. Markelov. *Ter. Arkh.* 40(5):49-53, 1968.

3538 **THE LONG-TERM BEHAVIOR OF SOME LIVER FUNCTION TESTS IN PATIENTS WITH A HISTORY OF VIRAL HEPATITIS.** *(It.)* Zanettin, G. M. (East. Munic. Hosp., Padua, Italy) and G. Lorenzin. *Epatologia* 13(5):1035-1042, 1967.

3539 **EFFECT OF ARGININE-GLUCOSE-1-PHOSPHATE ON THE TOXICOSES DUE TO VIRAL HEPATITIS IN CHILDHOOD.** *(It.)* Cocuzza, S. (Pediat. Clin., U. Turin, Italy). *Epatologia* 13(5):1167-1172, 1967.

3540 **ORAL LYSOZYME IN THE TREATMENT OF VIRAL HEPATITIS.** *(It.)* Zanettin, G. M. (East. Munic. Hosp., Padua, Italy) and G. Lorenzin. *Epatologia* 13(5):1213-1220, 1967.

3541 **COMPARATIVE EVALUATION OF CORTISONE AND LYSOZYME IN THE TREATMENT OF VIRAL HEPATITIS.** *(It.)* Pagliano-Sassi, L. (Hosp. Maggiore, Milan, Italy) and A. Moreno. *Epatologia* 13(5):1221-1224, 1967.

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3543 **STUDIES ON MURINE HEPATITIS DUE TO EFH-120 VIRUS: THE ANTIINFLAMMATORY ACTIVITY OF LYSOZYME.** *(It.)* Brusca, A. E. (Inst. Microbiol., U. Messina, Italy), P. Mastroeni, O. Dionisi, A. Rocca and F. Orecchio. *Epatologia* 13(5):1235-1246, 1967.

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3547 **FAMILIAL FOCI OF EPIDEMIC HEPATITIS IN CHILDREN.** *(Ger.)* Marinescu, G. (V. Babes Hosp. Infect. Dis., Bucharest, Romania), I. Predescu, M. Anghelută, T. Olariu and S. Stefănescu. [Pp. 610 to 613 in Infektionskrankheiten (Infectious Diseases). (Proceedings of the 4th International Congress for Infectious Diseases, Munich, 26-30 April 1966.) Mossner, G. (Med. Clin., Freiburg U., Germany) and R. Thommsen, Eds. F. K. Schattauer Verlag, Stuttgart, 1967. 998 pp.]

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3549 **THE ACTIVITY OF SOME SERUM DEAMINASES DURING HUMAN AND EXPERIMENTAL VIRAL HEPATITIS.** *(It.)* Giusti, G. (Infect. Dis. Clin., U. Naples, Italy) and B. Galanti. [Pp. 597 to 601 in Infektionskrankheiten (Infectious Diseases). (Proceedings of the 4th International Congress for Infectious Diseases, Munich, 26-30 April 1966.) Mossner, G. (Med. Clin., Freiburg U., Germany) and R. Thommsen, Eds. F. K. Schattauer Verlag, Stuttgart, 1967. 998 pp.]

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3553 **THE DIAGNOSTIC VALUE OF THE HETEROAGGLUTINATION REACTION OF HOYT AND MORRISON IN VIRAL HEPATITIS.** *(It.)* Scioli, C., G. da Villa and F. Fiorentino. [Pp. 577 to 582 in Infektionskrankheiten (Infectious Diseases). (Proceedings of the 4th International Congress for Infectious Diseases, Munich, 26-30 April 1966.) Mossner, G. (Med. Clin., Freiburg U., Germany) and R. Thommsen, Eds. F. K. Schattauer Verlag, Stuttgart, 1967. 998 pp.]

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3557 **STATISTICAL OBSERVATIONS ON THE COURSE OF THE ACUTE PHASE AND ON THE EVENTUAL OUTCOME OF VIRAL HEPATITIS: 460 CASES FOLLOWED BY CLINICAL OBSERVATION AND DETERMINATION OF BIOLOGICAL PARAMETERS.** *(It.)* De Ritis, F. (Infect. Dis. Clin., U. Naples, Italy), G. Giusti, F. Piccinino and L. Cacciatore. [Pp. 643 to 650 in Infektionskrankheiten (Infectious Diseases). (Proceedings of the 4th International Congress for Infectious Diseases, Munich, 26-30 April 1966.) Mossner, G. (Med. Clin., Freiburg U., Germany) and R. Thommsen, Eds. F. K. Schattauer Verlag, Stuttgart, 1967. 998 pp.]

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3559 **INFECTIOUS HEPATITIS IN OLD AGE.** *(E.)* Tigano, F. (Clin. Infect., Trop. & Subtrop. Dis., U. Messina, Italy). [Pp. 633 to 635 in Infektionskrankheiten (Infectious Diseases). (Proceedings of the 4th International Congress for Infectious Diseases, Munich, 26-30 April 1966.) Mossner, G. (Med. Clin., Freiburg U., Germany) and R. Thommsen, Eds. F. K. Schattauer Verlag, Stuttgart, 1967. 998 pp.]

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3562 **VIRAL HEPATITIS AND PREGNANCY.** *(Ger.)* Mudrić, V. (Med. Fac., U. Novi Sad, Yugoslavia), R. Prudan, A. Sesler and R. Borota. [Pp. 615 to 622 in Infektionskrankheiten (Infectious Diseases). (Proceedings of the 4th International Congress for Infectious Diseases, Munich, 26-30 April 1966.) Mossner, G. (Med. Clin., Freiburg U., Germany) and R. Thommsen, Eds. F. K. Schattauer Verlag, Stuttgart, 1967. 998 pp.]

3563 **CHANGES IN PLATELET THROMBOPLASTIN ACTIVITY DURING THE COURSE OF ACUTE EPIDEMIC VIRAL HEPATITIS.** *(It.)* Ravazzoni, L. (Infect. Dis. Clin., U. Rome, Italy) and E. Casini. [Pp. 665 to 667 in Infektionskrankheiten (Infectious Diseases). (Proceedings of the 4th International Congress for Infectious Diseases, Munich, 26-30 April 1966.) Mossner, G. (Med. Clin., Freiburg U., Germany) and R. Thommsen, Eds. F. K. Schattauer Verlag, Stuttgart, 1967. 998 pp.]

3564 **OBSERVATIONS ON THE COURSE AND TREATMENT OF VIRAL HEPATITIS IN CHILDHOOD.** *(It.)* Gotti, D. (Dept. Infect. Dis., U. Bologna, Italy). [Pp. 661 to 664 in Infektionskrankheiten (Infectious Diseases). (Proceedings of the 4th International Congress for Infectious Diseases, Munich, 26-30 April 1966.) Mossner, G. (Med. Clin., Freiburg U., Germany) and R. Thommsen, Eds. F. K. Schattauer Verlag, Stuttgart, 1967. 998 pp.]

3565 **LYSOZYME IN THE THERAPY OF VIRAL HEPATITIS.** *(E.)* Rognoni, F. (A. Fleming Res. Inst., Milan, Italy), M. Ninni and T. Barbui. [Pp. 653 to 659 in Infektionskrankheiten (Infectious Diseases). (Proceedings of the 4th International Congress for Infectious Diseases, Munich, 26-30 April 1966.) Mossner, G. (Med. Clin., Freiburg U., Germany) and R. Thommsen, Eds. F. K. Schattauer Verlag, Stuttgart, 1967. 998 pp.]

3566 **ISOLATION OF CHAI-VIRUSES DURING AN EPIDEMIC OF INFECTIOUS HEPATITIS.** *(Ger.)* Spies, K. (Inst. Virol., Humboldt U., Berlin, Germany). [Pp. 569 to 572 in Infektionskrankheiten (Infectious Diseases). (Proceedings of the 4th International Congress for Infectious Diseases, Munich, 26-30 April 1966.) Mossner, G. (Med. Clin., Freiburg U., Germany) and R. Thommsen, Eds. F. K. Schattauer Verlag, Stuttgart, 1967. 998 pp.]

3567 **VIRUSES ISOLATED FROM EPIDEMIC HEPATITIS PATIENTS: INVESTIGATIONS ON THE PROPERTIES AND ROLE OF VIRUSES IN THE ETIOLOGY OF THE DISEASE.** *(E.)* Mitroiu, O. (Inst. Inframicrobiol., Acad. Sci., Bucharest, Romania), N. Cajal, I. P. Cuo and N. Sahnazarov. [Pp. 563 to 568 in Infektionskrankheiten (Infectious Diseases). (Proceedings of the 4th International Congress for Infectious Diseases, Munich, 26-30 April 1966.) Mossner, G. (Med. Clin., Freiburg U., Germany) and R. Thommsen, Eds. F. K. Schattauer Verlag, Stuttgart, 1967. 998 pp.]

3568 **ULTRASTRUCTURAL CHANGES IN THE MITOCHONDRIAL APPARATUS OF MOUSE HEPATOCYTES INFECTED EXPERIMENTALLY WITH EFH-120 HEPATITIS VIRUS AND TREATED WITH ORGANIC POLYCATIONS.** *(It.)* Amato, A. (Inst. Med. Microbiol., U. Messina, Italy), A. L. Costa and M. Spadaro. *Epatologia* 13(2):337-344, 1967.

3569 **THE PREVENTION OF (VIRAL) HEPATITIS.** *(E.)* Grady, G. F. [Disease-a-month for July 1968]. Chicago, Year Book Medical Publishers, 1968. 29 pp.

3570 **INFECTIOUS HEPATITIS: PRESENTATION OF 60 CASES, 47 BENIGN, 11 ASSOCIATED WITH OTHER CLINICAL ENTITIES AND 2 WITH COMPLICATIONS.** *(Por.)* de Barros Filho, S. D. (Dept. Inf. Dis., Fernandes Figueira Inst., Rio de Janeiro, Brazil) and A. Campos. *J. Pediat. (Rio)* 33(1/2):7-10, 1968.

3571 **CHARACTERISTIC FEATURE OF THE COURSE OF EPIDEMIC HEPATITIS IN INFANTS.** *(Rus.)* Shestakova, N. G. (Child. Infect. Dis. Hosp. No. 27, Moscow, USSR). *Vop. Okhr. Materin. Dets.* (7):83-84, 1968.

3572 **POLARIGRAPHIC METHOD FOR BLOOD SERUM STUDIES IN THE CLINICAL TREATMENT OF HEPATITIS IN CHILDREN.** *(Rus.)* Akhmina, N. I. (Moscow Sci. Res. Inst. Pediat. & Pediat. Surg., USSR) and E. F. Mairanovskaia. *Vop. Okhr. Materin. Dets.* (7):84-85, 1968.

3573 **SOME LIPID METABOLISM INDICES IN INFECTIOUS HEPATITIS IN CHILDREN.** *(Rus.)* Tarasova, G. G. (Leningrad Sci. Res. Inst. Child. Infections, USSR). *Vop. Okhr. Materin. Dets.* (7):51-54, 1968.

3574 **ACID-BASE BALANCE IN CHILDREN WITH INFECTIOUS HEPATITIS.** *(Rus.)* Mar'ich, L. N. (Leningrad Sci. Res. Inst. Child. Infect., USSR). *Vop. Okhr. Materin. Dets.* (7):54-57, 1968.

3575 **SIGNIFICANCE OF SOME BIOCHEMICAL TESTS IN THE DIAGNOSIS OF BOTKIN'S DISEASE IN CHILDREN.** *(Rus.)* Zubikova, I. I. (2d Pirogov Moscow Med. Inst., USSR). *Vop. Okhr. Materin. Dets.* (7):45-50, 1968.

3576 **SOME PROBLEMS OF THE DISPENSARY EXAMINATION OF CHILDREN WHO HAVE HAD VIRAL HEPATITIS.** *(Rus.)* Bondareva, N. V. (Minsk Infect. Dis. Hosp., USSR). *Vop. Okhr. Materin. Dets.* (7):34-39, 1968.

3577 **CHARACTERISTICS OF RESIDUAL SYMPTOMS FOLLOWING BOTKIN'S DISEASE IN CHILDREN.** *(Rus.)* Nisevich, N. I. (2d Pirogov Moscow Med. Inst., USSR) and S. P. Iefimova. *Vop. Okhr. Materin. Dets.* (7):25-30, 1968.

3578 **THE PROBLEM OF THE OUTCOME OF VIRUS HEPATITIS IN CHILDREN ACCORDING TO CLINICAL, BIOCHEMICAL, AND MORPHOLOGICAL DATA.** *(Rus.)* Novikova, O. A. (Riga Med. Inst., USSR). *Vop. Okhr. Materin. Dets.* (7):30-34, 1968.

3579 **COMPARISON OF THE CHARACTERISTICS OF SERUM PROTEIN ELECTROPHORESIS DATA IN THE NONICTERIC, ATTENUATED, AND ICTERIC FORMS OF EPIDEMIC HEPATITIS IN CHILDREN.** *(Rus.)* Bochko, A. V. (Child. Infect. Dis. Hosp., Krasnodar, USSR). *Vop. Okhr. Materin. Dets.* (7):86, 1968.

3580 **PROCONVERTINE AND PROTHROMBIN LEVELS IN CHILDREN AFTER BOTKIN'S DISEASE IN THE PRESENCE OF RESIDUAL SHIFTS AND BILIARY TRACT COMPLICATIONS.** *(Rus.)* Zhuravlev, N. P. ("Lastochka" Child. Sanatorium, Leningrad, USSR). *Vop. Okhr. Materin. Dets.* (7):87, 1968.

3581 **ASCORBIC ACID LEVELS IN THE BLOOD AND URINE IN EPIDEMIC HEPATITIS IN CHILDREN.** *(Rus.)* Komar, V. I. (Grodno Med. Inst., USSR). *Vop. Okhr. Materin. Dets.* (7):88, 1968.

3582 CLINICAL AND STATISTICAL STUDY OF THE TREATMENT OF INFANTILE VIRAL HEPATITIS WITH URIDINE DIPHOSPHOGLUCOSE. *(It.)* Givone, S. (Koelliker Hosp., Turin, Italy) and B. Guglielmo. *Minerva Nipiol.* 17(2):65-69, 1967.

3583 CLINICAL AND STATISTICAL STUDY AND EPIDEMIOLOGY OF CERTIFIED CASES OF VIRAL HEPATITIS IN CATANZARO PROVINCE DURIN THE DECADE 1956-1965. *(It.)* Cannistra, S. (Inst. Hyg., Messina U., Italy) and G. Curro. *Gior. Mal. Infett.* 19(8): 510-518, 1967.

3584 **ALBUMIN EXCHANGE BETWEEN PLASMA AND ASCITIC FLUID.** *(E.)* Dykes, P. W. (Dept. Exp. Path., U. Birmingham, England) and J. H. Jones *Clin. Sci.* 34:185-197, 1968.

Eleven patients with longstanding ascites were investigated. Eight had cirrhosis of the liver, 2 had cardiac cirrhosis due to chronic rheumatic heart disease, and 1 patient had lymphosarcoma. All patients were weighed and girth measurements were taken at regular intervals. Thyroid uptake of radioactive iodine was minimized by the oral administration of potassium iodide (200 mg/day). Radioactive iodine-labeled Lister human serum albumin was injected both i.v. and i.p. to investigate transfer to and from ascitic fluid. After a short delay, the injected albumin arrived in the ascitic fluid of plasma at a constant rate for up to 4 hr. It was calculated that more albumin passed from plasma to ascitic fluid than in the reverse direction. Further observations on the rate of albumin leaving the ascitic fluid revealed higher values than plasma to ascites transfer. This early loss from the peritoneal cavity may be due to diffusion of albumin into an adjacent extraperitoneal space. Albumin concentrations in this space are similar to those in ascitic fluid.

3585 **EXPERIMENTAL TOXIC CIRRHOSIS IN THE RAT: II. KINETICS OF HEPATOCYTE PROLIFERATION DURING INTERMITTENT THIOACETAMIDE INTOXICATION.** *(E.)* Shea, S. M. (Harvard Med. Sch., Boston, Massachusetts) and E. J. Manseau. *Amer. J. Path.* 52(1):55-67, 1968.

Eighty-two male albino Sprague-Dawley rats, weighing initially 150-160 g, were used. Thirty-four rats receiving thioacetamide were lost from the experiment; 13 additional rats were used as radioautographic controls. A 4% aqueous solution of thioacetamide, 20 mg/100 g of body weight, was injected i.p. three times a week. Rats were sacrificed after 1,2,3,4,5,6,8, and 12 weeks. Half the animals were killed 24 hr and half, 48 hr after an injection of thioacetamide. Each rat received 2 μc/g of body weight of ^{3}H-thymidine 1 hr before sacrifice. Cirrhosis was established in the 7 rats surviving 12 weeks. The degree of hepatocyte population involvement was determined in relation to the hepatocyte populations of the cirrhotic pseudolobules determined histologically. A periodic fluctuation of DNA synthesis in relation to thioacetamide injections is shown by ^{3}H-thymidine labeling and radioautography. Birth and death rate functions were constructed showing periodic fluctuations of appropriate amplitude and period. This model shows that an initial population of 500-2000 cells undergoes considerable random fluctuations in size, similar to those predicted from previous studies of carbon cirrhosis.

3586 **THE RATES OF DISTRIBUTION AND CATABOLISM OF ALBUMIN IN NORMAL SUBJECTS AND IN PATIENTS WITH CIRRHOSIS OF THE LIVER.** *(E.)* Dykes, P. W. (Dept. Exp. Path., U. Birmingham, England). *Clin. Sci.* 34(1):161-183, 1968.

Human serum ^{131}I-labeled albumin, prepared by an ether fractionation process, was used to study rates of distribution and catabolism and the size of the exchanging albumin pools in 5 normal subjects and in patients with hepatic cirrhosis. Analysis of the derived curves supports the division of extravascular distribution into two broad groups, one mixing rapidly at 12-24 hr, and the other not reaching equilibrium for up to 8 days. Ascitic fluid measurements revealed a similar pattern, supporting evidence of delivery of newly synthesized albumin to the plasma. Catabolic rates (205 mg/kg/day in normal subjects) determined by multi-compartmental plasma curve analyses agreed satisfactorily with values obtained from urinary excretion of radioiodine. Although serum albumin concentrations in the cirrhotics were low, plasma volume was greatly increased, and total plasma albumin and total exchangeable albumin were not markedly reduced. The fractional rates of exchange between plasma and tissue albumin were reduced, being accounted for by the expanded plasma volume.

3587 **HEPATIC GLOMERULOSCLEROSIS: AN ANALYSIS OF 60 CASES.** *(E.)* Guillan, R. A. (VA Hosp., Topeka, Kansas), S. Zelman and R. A. Alonso. *Amer. J. Gastroent.* 49(6):499-502, 1968.

A study of 60 autopsied cases of hepatic glomerulosclerosis is presented; review of clinical and laboratory records provided evidence of renal damage. Albuminuria was noted in 18 of the 60 patients; 22 showed minimal urinary leucocytes, 11 had erythrocytes, 13 had haline casts, and 3 had granular casts. Slight scarring and congestion of the kidney were evident upon gross examination; histological study revealed tubular lipids and varying degrees of glomerulosclerosis. A statistically significant relationship was seen between the degrees of glomerulosclerosis and liver cell damage; the duration of liver disease also correlated with the degree of glomerulosclerosis. Materials found in glomeruli in the course of the disease are suggested as deriving from liver cell breakdown, not from antigen-antibody complexes.

3588 **EFFECTS OF PANCREATIC EXTRACT ON INTESTINAL IRON ABSORPTION IN LIVER CIRRHOSIS.** *(E.)* Brodanova, M. (First Med. Clin., Charles U., Prague, Czechoslovakia), V. Hoenig, V. Brodan and E. Kuhn. *Acta Hepatosplen. (Stuttgart)* 15(3):141-146, 1968.

Iron absorption was studied in 10 liver cirrhosis patients given 1200 mg of iron gluconate for 3-4 days and then given 1500 mg of pancreatin in addition to the iron. Blood samples were drawn before and 1, 2, 4, and 7 hr after administration; plasma iron was determined by the rhodamine method. Eight healthy subjects were used as controls. The average rise seen in cirrhotic patients after iron administration was greater than that seen in the control group. Pancreatin administration significantly depressed serum iron after oral iron loading, but not after i.v. administration. It is concluded that pancreatic extracts lower gastrointestinal iron absorption in cirrhotic subjects.

3589 **ANAEMIA IN CIRRHOSIS OF LIVER – A CLINICAL STUDY.** *(E.)* Singh, R. (G.S.V.M. Med. Coll., Kampur, India), B. L. Agrawala and S. Singh. *Indian Pract.* 21(4):259-261, 1968.

Anemia was found in 86% of 50 biopsy-confirmed cases of liver cirrhosis. The hemoglobin concentration was below 6 g%

in 20% of these patients, between 6 and 10 g% in 48%, and between 10 and 13 g% in the remaining 18%. The duration of cirrhosis did not affect the severity of anemia. The anemia was normocytic in 40%, macrocytic in 34%, and microcytic hypochromic in 12% of the anemic patients. Microcytic hypochromic anemia was associated with repeated gastrointestinal bleeding. Increased blood reticulocytes and deficiencies of folic acid and vitamin B_{12} (antianemic factors) play a minor role in the genesis of macrocytic anemia.

3590 SYNDROME OF HEPATITIS AND APLASTIC ANEMIA.

(E.) Rubin, E. (Mount Sinai Sch. Med., New York City), C. Gottlieb and P. Vogel. *Amer. J. Med.* 45(1):88-97, 1968.

The case histories of 10 patients (2-20 yr of age) with pancytopenia following icteric and anicteric viral hepatitis are presented; 7 cases ended fatally. The latent period between hepatitis and pancytopenia may vary from 2 to 24 weeks. The hematologic disorder did not correlate with the severity or duration of hepatitis, or with the morphological appearance of the liver. A possible viral etiology has been suggested for the association of aplastic anemia and hepatitis.

3591 BURR CELLS, HEMOLYTIC ANEMIA AND CIRRHOSIS.

(E.) Grahn, E. P. (VA Hosp., Hines, Illinois), A. A. Dietz, S. S. Stefano and W. J. Donnelly. *Amer. J. Med.* 45(1):78-87, 1968.

To determine the incidence and type of morphological erythrocyte distortion in dried blood films, to correlate associated clinical, hematologic and biochemical data, to verify the effects of red cell and plasma incubation, and to characterize the serum component or components possibly involved in erythrocyte distortion, blood samples were drawn and studied from 118 liver disease patients and 15 normal male subjects. Poikilocytosis, attributable to alcoholism, characterized the stained blood films of 10 patients. An increased incidence of morphologically abnormal erythrocytes was seen in wet preparations of blood. The most common type of abnormal red cell was the discoid, ellipsoid, or spherical cell whose surface bore blunt or spiny projections similar to acanthocytes; the other type consisted of severely distorted, often contracted or fragmented, erythrocytes with bizarre shapes and that bore one or more finger- or club-like projections in addition to blunt protuberances. Acanthroid erythrocytes in wet blood preparations constituted 10-98% of red cell populations in 47 of the 103 patients with alcohol-induced liver injury, and 1-10% in 71 other patients with alcoholic and nonalcoholic liver disease. The 10 patients with burr cells had a 50-98% incidence of burr and acanthroid cells. Acanthroid erythrocyte transformation was induced by the serum of patients with burr and acanthroid cells during incubation. Normal serum restored acanthroid, but not burr cells, to normalcy. A serum albumin association is suggested in acanthroid transformation. Further studies are now in progress to determine the role of other serum proteins in acanthroid transformation.

3592 STUDIES IN HEPATIC INJURY INDUCED BY EXPERIMENTAL PORTACAVAL SHUNTS.

(E.) Rubin, E. (Mount Sinai Sch. Med., New York City). *Israel J. Med. Sci.* 4(1):155-158, 1968.

End-to-side and side-to-side portacaval shunts were established in rats, and their effects on liver were investigated 30-120 days after surgery. Each animal was given 0.5 μC/g of body weight of tritiated thymidine. Liver tissue was examined by electron microscopy; liver cell damage was indicated by increased variability in electron density of hepatocytes, mild mitochondrial swelling, focal dilatation of the rough endoplasmic reticulum, and an increase in lipid droplets. Four times as many labeled hepatocytes were evident in autoradiographs in rats subjected to end-to-side shunts than in sham operated animals. It is assumed that increased hepatocyte DNA synthesis is a response to liver cell loss. Rats with portacaval shunts were fed normal and iron supplemented diets to determine whether hepatic siderosis is a direct effect of portal blood diversion from the liver. Rats with end-to-side shunts on both diets showed hepatocyte iron accumulation; no histologically stainable iron, except for slight Kupffer cell deposition, was found in rats with side-to-side shunts or in sham operated animals. Saturation of the plasma iron binding capacity was greater in animals with end-to-side shunts. Increased gastrointestinal iron absorption after end-to-side shunt is probable. Hepatic detoxifying enzyme activities were decreased, which effect may play an important role in portasystemic encephalopathy.

3593 INTRAHEPATIC VASCULAR CHANGES IN CIRRHOSIS.

(Fr.) Purriel, P. (Clin. Hosp., Montevideo, Uruguay), M. Arcos Perez and W. Meerhoff. *Presse Med.* 76(20):955-960, 1968.

Vinyl-resin or latex casts of the hepatic circulation in 14 normal and 20 cirrhotic livers (12 with alcoholic cirrhosis, 4 with nonalcoholic Laennec's cirrhosis and 4 with postnecrotic cirrhosis; 14 males and 6 females, 15 of them over 50 yr of age) revealed 4 principal types of vascular abnormalities associated with cirrhosis: a) bivenous anomalies affecting mainly the suprahepatic veins, without shunts; b) bivenous anomalies of the suprahepatic veins with portal-suprahepatic bivenous shunts; c) bivenous anomalies resulting in increased intra- and extrahepatic arterial circulation, but without shunts; and d) bivenous anomalies resulting in increased intrahepatic circulation, without bivenous shunts but with arteriovenous anastomoses. There was no correlation between these vascular anomalies and the type or etiology of the cirrhosis or the degree of fibrosis; however, shunts were found in 55.5% of cirrhotic livers weighing 500-1000 g, 40% of those weighing 1000-1500 g, and in none of those weighing more than 1500 g. Significant decreases in size of the hepatic and portal veins were seen in 20 of 20 and 11 of 20 cirrhotic livers, resp.; significant increases in hepatic artery size were seen in 8 cases, bivenous shunts in 9, and shunts between the hepatic artery and the portal vein in 5. The hemodynamic characteristics of each type of vascular abnormality are discussed and it is emphasized that the retrograde currents caused by arteriovenous shunts can make the portal vein a carrier of arterial hepatic blood. This situation contraindicates the practice of treating portal hypertension by ligation of the portal vein and end-to-side portacaval anastomosis, which is acceptable only if the obstruction is in the hepatic vein. In the absence of precise information as to the hemodynamic characteristics of the particular liver, which is difficult to obtain during life, side-to-side portacaval anastomosis is recommended as the best procedure for the treatment of presinusoidal and sinusoidal hypertension.

3594 INDIRECT REACTING HYPERBILIRUBINEMIA IN CIRRHOSIS: ITS RELATION TO RED CELL SURVIVAL. *(E.)*

Felsher, B. F. (U. Southern California Sch. Med., Los Angeles), A. G. Redeker and T. B. Reynolds. *Amer. J. Dig. Dis.* 13(7):598-607, 1968.

This study was undertaken to define the role of hemolysis in the pathogenesis of indirect hyperbilirubinemia in cirrhosis. The subjects were 16 patients, 11 men and 5 women, with Laennec's cirrhosis and persistent indirect hyperbilirubinemia. Indirect hyperbilirubinemia was defined as a total serum bilirubin of 2.5 mg/100 ml or greater, with a bilirubin ratio (direct-reacting bilirubin per total bilirubin) of less than 30%. The diagnosis of Laennec's cirrhosis was made on clinical grounds, biochemical tests, and in 11 patients by liver biopsy. A group of 12 patients with Laennec's cirrhosis and direct hyperbilirubinemia served as a control. The incidence and magnitude of splenomegaly and esophageal varices as reflected in the various liver function tests, hepatic histology, and in the clinical status, were similar in the 2 groups. Three of the patients in the study group had had portacaval shunts prior to the study. In the study group, the total serum bilirubin varied from 2.5 to 9.8 mg/100 ml, the direct bilirubin varied from 0.5 to 2.5 mg/100 ml, the indirect bilirubin varied from 1.9 to 7.8 mg/100 ml and the bilirubin ratio varied from 16 to 28%. In the control group, the corresponding values were 1.5-9.6; 0.6-3.4; 0.7-6.2 and 36-56%. Radiochromate-labeled red-cell survival studies in 12 of the patients in the study group showed a mean red-cell survival of 17.9 days, compared to a mean of 23.6 days in the control group. The difference was statistically significant. The serum indirect bilirubin concentration and the red-cell half-lives tended to be inversely related in the patients with indirect hyperbilirubinemia. Splenic sequestration was demonstrated in 5 of 10 patients in the study group and in 1 patient in the control group.

3595 FALSE-POSITIVE LIVER SCANS IN PATIENTS WITH ALCOHOLIC LIVER DISEASE. *(E.)*

Klion, F. M. (Mt. Sinai Hosp., New York City) and A. Z. Rudavsky. *Ann. Intern. Med.* 69(2):283-291, 1968.

Detailed case reports are presented for 6 patients (1 man and 5 women, 48-58 yr old) in whom hepatic scintiscans with radioactive colloidal gold (200 μC i.v.), done because of a sudden deterioration in the clinical course, revealed discrete areas of decreased isotope uptake suggestive of primary or secondary hepatic carcinoma, but in whom needle biopsies of these "cold" areas revealed fatty cirrhosis rather than neoplasia. Three of these patients had ascites, 3 had varices, all had hepatomegaly, 2 had splenomegaly, 3 were markedly anemic (hemoglobin of 7.8-9.9 g%), 5 of 5 studied had elevated erythrocyte sedimentation rates, the serum bilirubin was 1.0-3.1 mg% in 5 of 6, 7.3 mg% in 1 of 6, the alkaline phosphatase was 7.0-9.2 Bessey-Lowry units in 2 of 6, 14-18 King-Armstrong units in 3 of 6 and 38 King-Armstrong units in 1 of 6, the serum albumin was 2.2-3.1 g% and the serum globulin was 2.5-4.3 g%. It is concluded that needle biopsy is required for a correct diagnosis of the "cold" areas in liver scans obtained from cirrhotic patients, since these areas can be due to cysts, infarcts, fibrosis and abscesses as well as to neoplastic disease.

3596 HYPERTROPHY OF THE LOBE OF SPIEGEL IN CIRRHOSIS. *(Fr.)*

Pietri, H. (St. Marguerite Hosp., Marseille, France) and C. Guien. *Epatologia* 13(3):597-600, 1967.

Based on experience with 30 cirrhotic patients (26 with alcoholic cirrhosis), 5 of whom had marked ascites which interfered with radiologic examination, it is pointed out that hypertrophy of the lobe of Spiegel cannot usually be detected by laparoscopy, scintillation scanning, splenoportography or arteriography, but only by frontal tomography after insufflation of the peritoneal and retroperitoneal spaces with 300-500 ml and 1000-1200 ml of air, resp. Hypertrophy of the lobe of Spiegel was found in 12 of the 30 cases by means of tomography, only 1 of which (misdiagnosed as due to malignancy) had been detected by laparoscopy. Hypertrophy of this lobe, which may be a contraindication to portacaval shunt surgery, is generally accompanied by atrophy of the right and left lobes, and always seems to precede hypertrophy of any other area of the liver. The predilection of this lobe for hypertrophy is ascribed to its particularly developed vascularization.

3597 COPPER AND MANGANESE CONCENTRATIONS IN BILIARY CIRRHOSIS OF LIVER. *(E.)*

Worwood, M. (Inst. Cancer Res., Belmont, Sutton, Surrey, England), D. M. Taylor and A. H. Hunt. *Brit. Med. J.* 3(5614):344-346, 1968.

Neutron activation analysis of liver biopsy and necropsy specimens revealed mean Cu concentrations of 186 μg/g wet liver (range 99-310) in 10 patients with primary biliary cirrhosis, 17.0 μg/g (3.9-52.7) in 32 patients with alcoholic or idiopathic cirrhosis, and 9.1 μg/g (2.6-14.4) in 5 patients with chronic extrahepatic biliary obstruction and 4 normal controls; 1 patient with extrahepatic biliary obstruction accompanying carcinoma of the liver had a Cu concentration of 76 μg/g. The Mn concentration was also somewhat elevated in biliary cirrhosis and extrahepatic biliary obstruction (mean of 2.1-2.3 μg/g wet liver compared to 1.5 in normal adults), but not in alcoholic or idiopathic cirrhosis. Iron, cobalt and zinc levels were the same in biliary cirrhosis as in other types of cirrhosis. The serum ceruloplasmin was 31-59 mg% in patients with cirrhosis, compared to 32 ± 3 mg% in normal volunteers, but did not seem to be related to the hepatic Cu concentration. In female August rats, ligation of the bile duct followed by administration of copper acetate (100 μg/day i.p.) for 10 days resulted in a marked increase in liver Cu (to 77 μg/g compared to 4.7 μg/g in controls with or without bile duct ligation) but very little increase in serum ceruloplasmin (optical density of 1.32-1.39 in rats with ligated bile ducts, with or without administration of copper, compared to 0.94 in controls). The mechanism of the increased Cu concentrations in primary biliary cirrhosis remains unclear, but a determination of hepatic Cu may be of value in the differential diagnosis of intra- and extrahepatic biliary obstruction.

3598 THE INCREASING MORTALITY ATTRIBUTED TO CIRRHOSIS AND FATTY LIVER, IN BALTIMORE (1957-1966). *(E.)*

Kramer, K. (Sch. Hyg. & Publ. Hlth., Johns Hopkins U., Baltimore, Md.), L. Kuller and R. Fisher. *Ann. Intern. Med.* 69(2):273-282, 1968.

Cirrhosis mortality among young adults aged 25 to 44, was studied by reviewing death certificates, medical examiner's reports, and autopsy protocols. A substantial increase in cirrhosis mortality was noted, being greatest for Negro women (260%). Death rates were higher in Negroes than in Whites and higher in men than in women. Higher rates were also found in lower socio-economic classes. The increase in mortality rates was mainly due to an increase of deaths certified as being caused by cirrhosis by the medical examiner. When the certified deaths were compared with those not so certified, it was found that the former were usually sudden and unexpected deaths occurring outside of a hospital, while the latter were usually not sudden deaths and occurred in a hospital. The main pathological finding in the certified deaths was a large fatty liver, while the main finding in the noncertified deaths was a cirrhotic liver. For the nonsudden deaths, there was little change in the death rate, while for sudden deaths, there was a substantial increase.

3599 DEVELOPMENT OF PORTAHEPATIC VENOUS SHUNTS AND CIRRHOSIS IN CARBON TETRACHLORIDE POISONING IN RATS. *(E.)* Hase, T. (Walter Reed Army Med. Ctr., Washington, D. C.). *Amer. J. Path.* 53(1):83-91, 1968.

Hepatic microcirculatory changes in the terminal stages of carbon tetrachloride poisoning were observed in 110 male albino rats injected with carbon tetrachloride for 20 weeks; 6 rats were killed weekly from the fourth to tenth weeks and every other week until the twentieth week. Twenty-eight rat livers were perfused through the portal vein, 37 through the hepatic vein, and 28 were studied histologically; 17 rat deaths occurred in the course of the experiment. Carbon tetrachloride-induced cirrhosis is divided into 4 stages. The first stage, acute poisoning, consists mainly of diffuse damage and disruption of the microvasculature in the centrilobular region. Vascular lesion localized in central veins and pericentral sinusoids resulting in impaired sinusoidal drainage characterizes the second stage. Portahepatic venous shunts develop in the third stage and mesenchymal sclerosis in the fourth. Transition from the second to third stage occurred at the eighth week after the start of carbon tetrachloride poisoning. In the perfusion study, the livers began to offer increasingly higher resistance to injection of the silicone rubber perfusion mass through both the portal and hepatic venous routes at 14 weeks. The remaining animals, those used for histological studies, started dying at 16 weeks with the development of rapidly progressive anemia. It is suggested that the prominent periductal capillary plexuses and other vascular channels in the cirrhotic stage are responsible for the development of portal hypertension in carbon tetrachloride-induced cirrhosis.

3600 AMELORIDE ('MK 870') IN PATIENTS WITH ASCITES DUE TO CIRRHOSIS OF THE LIVER. *(E.)* Senewiratne, B. (Royal Free Hosp., London, England) and S. Sherlock. *Lancet* 1(7534):120-122, 1968.

Twenty-four patients with chronic liver disease and persistent ascites were treated with Amiloride (MK-870) to determine whether the potassium-sparing property of this compound could prevent a negative potassium balance and hypokalemia when used with frusemide or ethacrynic acid, without potassium supplements. Sodium retention was present before initiation of therapy. When a positive potassium balance was attained, total body potassium was measured and the patients started on amiloride 10 mg twice daily with either frusemide 40 mg/day (22 patients) or ethacrynic acid 50 mg/day (2 patients). Dosages of the latter 2 drugs were varied to keep the urinary excretion of sodium at 2 to 3 times the daily intake. Total body potassium determinations were done weekly on inpatients and every 4 to 6 weeks on outpatients. Patients were followed from 4 to 24 weeks. Fluid retention was controlled by the drug combination in 23 of 24 patients. The 1 therapeutic failure was in a patient with terminal liver disease. Five patients became potassium depleted on this regimen, although the serum potassium level remained normal in 4. Supplements of potassium and chloride easily corrected this deficit. The safety of the drug combination relies on the dietary intake of 70 mEq of potassium. Hyponatremia was not a contraindication to diuretic therapy. Patients who were initially hyponatremic did no worse than those who developed hyponatremia after treatment.

3601 SCINTOPHOTOGRAPHY IN CIRRHOSIS. *(E.)* Luthra, M. S. (Misericordia Hosp., Bronx, New York City), N. D. Scherl, D. Golden and C. J. Collica. *Arch. Intern. Med.* 122(3):211-213, 1968.

Thirty patients with alcoholic liver cirrhosis were studied by gamma camera scintophotography after intravenous injection of 200 μC of gold ^{198}Au. Hepatic area, splenic activity, bone marrow uptake and background activity were determined. Clinically, 27 patients had hepatomegaly and 3 had splenomegaly. Liver biopsies in 13 patients confirmed the diagnosis of cirrhosis. In 12 patients the liver was abnormally large, while in 8 patients the liver was abnormally small. Splenic uptake was significant in 18 patients including the 3 patients with splenomegaly. Bone marrow uptake was seen in 16 patients, while background activity was significantly increased in 24 patients. A mottled appearance of the liver with decreased hepatic uptake and ill-defined hepatic borders was noted. Cold areas were seen in only 1 patient. The appearance of the scintophotos with spleen, bone marrow, and small liver suggested a "flying bat."

3602 EXPERIMENTAL HEPATIC ENCEPHALOPATH IN THE RAT. *(Fr.)* Degos, J. D. (Beaujon Hos Clichy, Paris, France), R. Cloche, M. H. Bismuth and J. P. Benhamou. *Arch. Mal. Appar. Dig.* 57(2)(Suppl. 1):94, 1968.

3603 BACTERIAL ENDOCARDITIS AND CIRRHOS OF THE LIVER. *(E.)* Yoshikawa, T. T. (Harb Gen. Hosp., Torrance, Calif.) and A. D. Schwabe. *Amer. J. Dig. Dis.* 13(7):664-668, 1968.

3604 HEPATIC CIRRHOSIS: A PROBLEM IN COMMUNICATION. *(E.)* Popper, H. (Mount Sinai Sch. Med., New York City) and F. Schaffner. *Israel J. Med. Sci.* 4(1):1-7, 1968.

3605 SPLENOMEGALY IN CIRRHOSIS OF LIVER. *(E.)* Maheshwari, H. B. (Lady Harding Med. Coll., New Delhi, India). *Indian J. Med. Sci.* 22(4):241-245, 1968.

3606 CIRRHOSIS, HYPERAMMONEMIA AND LACTULOSE. *(E.)* Rottiers, R. (State U. Hos

Ghent, Belgium), J. Van Egmond, R. Verbruggen, G. Dierick, A. Vermeulen, J. De Groote, L. Standaert and L. Demeulenaere. *T. Gastroent.* 11(2):123-139, 1968.

3607 **CIRRHOSIS, CYANOSIS AND POLYCYTHAEMIA: MULTIPLE PULMONARY ARTERIOVENOUS ANASTOMOSES. [CASE REPORT]** *(E.)* Hutchison, D. C. S. (Royal Infirm., Edinburgh, Scotland), R. P. Sapru, M. D. Sumerling, G. W. K. Donaldson and J. Richmond. *Amer. J. Med.* 45(1):139-151, 1968.

3608 **THE MACROGLOBULINS OF THE BLOOD IN LIVER CIRRHOSIS AND IN CHRONIC PANCREATITIS.** *(E.)* Svartz, N. (King Gustav V Res. Inst., Stockholm, Sweden). *Epatologia* 13(5):1067-1072, 1967.

3609 **SERUM ADENOSINE PHOSPHOHYDROLASES AND ADENOSINE DEAMINASES DURING THE DEVELOPMENTAL STAGES OF HEPATIC CIRRHOSIS. PRELIMINARY COMMUNICATION.** *(It.)* Secchi, G. C. (Inst. Clin. Med., U. Milan, Italy), A. Rezzonico and N. Gervasini. *Epatologia* 13(5):1073-1080, 1967.

3610 **VARIATIONS IN THE IMMUNOGLOBULINS IN CIRRHOSIS.** *(It.)* Monteverde, A. (Hosp. Maggiore della Carita, Novara, Italy). *Epatologia* 13(5):1001-1008, 1967.

3611 **ALTERATIONS IN MEDULLARY FIBRINOLYSIS AS A TEST OF LIVER FUNCTION IN CIRRHOSIS.** *(It.)* Ninni, M. (East. Munic. Hosp., Padua, Italy) and T. Barbui. *Epatologia* 13(5):1081-1086, 1967.

3612 **THE EXISTENCE OF LATENT DISTURBANCES IN AMMONIA METABOLISM DURING THE INITIAL STAGES OF HEPATIC CIRRHOSIS.** *(It.)* Rezzonico, A. (Inst. Clin. Med., U. Milan, Italy), N. Gervasini, F. Azzolini, A. Cocchi and G. C. Secchi. *Epatologia* 13(5):1087-1090, 1967.

3613 **THE BEHAVIOR OF INTERMEDIATES OF THE GLYCOLYTIC PATHWAY IN THE ERYTHROCYTES OF CIRRHOTIC PATIENTS WITH ASCITES.** *(It.)* Rizzo, S. C. (Inst. Spec. Med. Path., U. Pavia, Italy). *Epatologia* 13(5):1091-1096, 1967.

3614 **THE TREATMENT OF MORGAGNI-LAENNEC'S CIRRHOSIS.** *(It.)* Izar, G. (Med. Fac., Siena, Italy). *Epatologia* 13(5):1149-1150, 1967.

3615 **BEHAVIOR OF THE SERUM CHOLINESTERASES IN PATIENTS WITH CIRRHOSIS OF THE LIVER.** *(It.)* Pietropaolo, C. (Inst. Gen. Clin. Med., U. Rome, Italy), G. Cali, F. De Benedictis, A. Centonze and F. Albisinni. *Gazz. Int. Med. Chir.* 72(23):2359-2367, 1968.

3616 **ROUND-TABLE DISCUSSION ON DECOMPENSATED CIRRHOSIS.** *(Sp.)* Findor, J. (Inst. Symptomatol., Buenos Aires, Argentina), M. Rigoli, V. Perez, J. C. Tallone and I. De Larrechea. *Dia Med.* 40(15): 345-352, 1968.

3617 **DISTURBANCES IN WATER AND ELECTROLYTE METABOLISM DURING DECOMPENSATED CIRRHOSIS: THE DANGER OF CERTAIN TYPES OF THERAPY.** *(Fr.)* Bodin, F. (St. Antoine Hosp., Paris, France), C. Liguory, P. Capelle and M. Conte. *Sem. Hop. Paris* 44(23/5):1591-1598, 1968.

3618 **CHYLIFORM ASCITES IN CIRRHOSIS (A BIOLOGICAL STUDY OF 4 CASES).** *(Fr.)* Lamotte, M. (Cochin Hosp., Paris, France), S. Lamotte-Barrillon and J. Guerre. *Arch. Franc. Mal. Appar. Dig.* 57(4/5):447-458, 1968.

3619 **THE SOCIAL COST OF ALCOHOLIC CIRRHOSIS.** *(Fr.)* Lereboullet, J. *Rev. Prat.* 18(15):SI-SVII, 1968.

3620 **FURTHER STUDIES ON ADENOCIRRHOSIS OF THE LIVER: MACROSCOPIC, STRUCTURAL AND ULTRASTRUCTURAL DIFFERENTIATION BETWEEN REGENERATIVE AND ADENOMATOUS NODULES IN IRREVERSIBLE EXPERIMENTAL HEPATIC CIRRHOSIS (ADENOCIRRHOSIS).** *(It.)* Costa, A. (Inst. Anat., U. Florence, Italy), G. Weber and F. Bartolini St. Omer. *Epatologia* 13(2):191-198, 1967.

3621 **IMMUNOGLOBULIN SHIFTS IN CHRONIC HEPATITIS AND ALCOHOLIC AND NON-ALCOHOLIC CIRRHOSIS.** *(It.)* Comoli, G. (Maggiore Hosp., Novara, Italy) and G. C. Allegra. *Prog. Med.* 24(9):311-315, 1968.

3622 **EFFECT OF SEROTONIN ON CARDIAC OUTPUT, RENAL PLASMA FLOW AND GLOMERULAR FILTRATION RATE IN PATIENTS WITH CIRRHOSIS OF THE LIVER.** *(It.)* Corea, L. (Inst. Spec. Med. Path., U. Perugia, Italy), V. Renzini, C. A. Brunori and C. Valori., *G. Clin. Med.* 49(2):201-210, 1968.

3623 **CIRRHOSIS, HYPERAMMONEMIA, AND LACTULOSE.** *(E.)* Rottiers, R. (State U. Hosp., Ghent, Belgium), J. Van Egmond, R. Verbruggen, G. Dierick, A. Vermeulen, J. de Groote, L. Standaert and L. Demeulenaere. *T. Gastroent.* 11(2):123-139, 1968.

3624 **CLASSIFICATION OF POST-CHOLECYSTECTOMY SYMPTOMS.** *(Cz.)* Herfort, K. (Gen. Med. Fac., Charles U., Prague, Czechoslovakia) and M. Keclik. *Cesk. Gastroent. Vyz.* 22(2):85-89, 1968.

Among 100 patients (18 men and 72 women, average age 45 yr) who presented an average of 7.9 yr postoperatively with a "post-cholecystectomy syndrome," 21 were found to be suffering from a new disease unrelated to the cholecystectomy (functional dyspepsia due to neurosis, infection, etc., ulcers, dyspepsia due to pancreatitis, migraine, chronic hepatitis, cirrhosis of the liver, stomach cancer, and mental illness). Among the other 79 cases, 51 could be classified as functional or symptomatic dyspepsia (13 in which the symptoms had been incorrectly ascribed to cholelithiasis and 38 in which symptoms of cholelithiasis had been mixed with persisting symptoms of pancreatitis, hiatus hernia or other conditions), 23 could be classified as due to biliary obstruction (either chronic or intermittent), and 5 were classified as "biliary colic of unknown etiology." Other possible causes of symptoms in the right upper abdomen (not represented in this series) include pyelonephritis, radiculitis, etc. It is recommended that a classification of this type, which is based on symptomatology rather than etiology in view of contemporary diagnostic limitations, be used in preference to the all-inclusive term "post-cholecystectomy syndrome."

3625 **GALL BLADDER CARCINOMA.** *(E.)* Caluzzi, F. (Clinica Chirurgica dell 'Universita di Torino), G. Giribone and A. Mussa. *J. Abdom. Surg.* 10(6): 151-155, 1968.

In 5 patients surgically treated, the diagnosis of gallbladder carcinoma was made only at surgery. Radical surgery in patients with localized lesions may give good results by following strict criteria. The operative procedure must entail the en bloc removal of the gallbladder, circumjacent portions of the liver, and lymph nodes draining the area. The operative technique consists of a standard upper midline abdominal incision. The left lobe of the liver is mobilized by ligature and division of the left triangular and falciform ligaments. Following isolation of hilum structures, right and left sagittal incisions are made which prolong to the inferior-anterior liver border from one side to the hepatoduodenal ligament, which is ligated, to the other side, at which point the two incisions are united. The branches of the bile duct, hepatic artery and portal vein are isolated, ligated and divided with branches that supply the paramediocaudal lobes, followed by exposure of the hepatic vein. Two rows of intraparenchymal sutures, placed 1 cm from each other, are placed on the anterior surface of the liver for hemostasis. Contrary to current operative procedures, only one incision is made between the 2 rows of sutures. The intermediate vein is found 3-4 cm from the surface. The medial vein is isolated, ligated and divided, followed by division of the 2 caudal branches of the right vein and the only branch of the left vein, leaving the main vessel medially. The paramediocaudal lobes are separated from the superior lobe by transverse dissection. The tributary vessels are ligated, dissection being aided by ischemic changes. The 2 segments with the gallbladder are removed en bloc. The lateral portion of the 2 hepatic lobes are approached by tying the intraparenchymal sutures, with omentum covering the raw areas. Devascularization of the common duct necessitates T-tube drainage. No complications were encountered at surgery or postoperatively. Three patients have remained well for several years with no evidenc of recurrence. One patient was lost to follow-up, the fifth patient died several months postoperatively with diffuse carcinomatosis.

3626 **BACTERIOLOGIC STUDIES OF BILIARY TRACT INFECTION.** *(E.)* Flemma, R. J. (U. S. Army Surg. Res. Unit, Brooke Army Medical Center, Fort Sam Houston, Texas), L. W. Flint, S. Osterhout and W. W. Shingleton. *Ann. Surg.* 166(1):563-572, 1967.

To provide a clear understanding of the term "cholangitis," aspiration and culture of intrahepatic bile at the time of percutaneous transhepatic cholangiography was performed with correlations made to pathophysiology and the type of obstruction. Bacteriologic data on a smaller goup of patient undergoing cholecystectomy for chronic cholecystitis withou common duct obstruction is also presented. Group I consisted of 75 patients undergoing percutaneous cholangiograp almost all of whom received broad-spectrum antibiotics 12 h previously. Three out of 30 patients with complete obstruction had positive cultures, compared with 29 out of 45 patients with partial obstruction. Of 32 positive cultures in th 75 patients with obstruction, 20 had a history of, or at examination had symptomatic cholangitis; 12 with positive cultures were asymptomatic at the time of bile culture. In 5 patients with partial obstruction with a past history of cholangitis, but asymptomatic during bile culture, blood cultures were made within a few hours of the cholangiograp because of chills and fever. Blood cultures revealed the sam organisms as obtained from bile cultures in all 5. Fifteen patients having partial obstruction in cholangiogram, had pr vious biliary-intestinal anastomosis. Positive cultures were found in 80%, regardless of the type of anastomosis (choledochojejunostomy-Roux-en-Y, choledochoduodenostomy, o cholecystojejunostomy); only 7 had histories of cholangitis. In 21 patients without obstruction and undergoing elective cholecystectomy, 11 had positive cultures, 5 with previous histories of cholangitis. Two of the 10 with negative cultures had previous histories of cholangitis. No significant differences were found in cultures of the gallbladder wall and gallbladder bile. Cholangitis is defined as inflammation of the bile ducts; although sometimes accompanied by inter mittent jaundice, chills and fever, these conditions are not necessarily mutally inclusive, nor do they necessarily exist together. No chills or fever were evident in 66% of the patients at the time of demonstrated partial obstruction and positive culture. An analogy between cholangitis and pyelonephritis is made. Asymptomatic "bactibilia" could becom clinical cholangitis by an acute change in partial obstructio leading to sudden increases in intraductal pressure, causing biliary mucosa rupture and septicemia.

3627 **CHANGING CONCEPTS IN THE SURGIC TREATMENT OF GALLSTONE ILEUS.**

(E.) Cooperman, A. M. (Mayo Clinic, Rochester, Minn.), E. R. Dickson and W. H. Remine. *Ann. Surg.* 167(3):377-383, 1968.

Formerly, surgical treatment of gallstone ileus consisted of enterotomy with removal of the stone and intestinal exploration. Surgical mortality is presently 15%, only recently ranging from 30-50%. Fourteen of 15 patients with gallstone ileus were operated upon, 8 by cholecystectomy, fistula repair and enterotomy (1 death), and 6 by enterotomy alone, 2 having had recurrent signs and symptoms of gallbladder disease. Since enterotomy alone does not prevent the complications of cholecystitis, recurrent gallstone ileus, cholangitis, and malabsorption, enterotomy, fistula repair, and cholecystectomy should be performed as a one-stage procedure, where feasible. When only enterotomy can be performed, periodic observation with proper surgical treatment, if persistent disease exists, should be done. The operative mortality in the 8 patients undergoing the combined procedure is not significantly different from enterotomy alone, and has the advantage of decreasing postoperative morbidity, formerly due to the persistence of a diseased gallbladder and a fistulous tract.

3628 POST-CHOLECYSTECTOMY SYMPTOMS.

(Ger.) Hloucal, L. (Distr. Hosp., Strakonice, Czechoslovakia). *Z. Ther.* 6(4):193-205, 1968.

Among 145 patients examined 3-7 yr after cholecystectomy, 94 were in excellent condition, 28 were in good condition (with occasional dyspepsia, pain and colic when dietary restrictions were not adhered to), and 23 (15.8%) had severe post-cholecystectomy symptoms (colic, fever, intermittent subicterus, anorexia and weight loss). These 23 patients included 5 of the 8 operated on for gallbladder disease in the absence of cholelithiasis and only 18 of the 137 treated for cholelithiasis. A 2nd operation became necessary in 11 cases, revealing that the symptoms were due to missed choledochal stones (6 cases), stenosing papillitis (2), hepatic duct stenosis (1), common bile stenosis (1), and chronic pancreatitis (1). On the basis of this experience and a review of the literature, the author discusses the diagnosis, pathogenesis and prevention of the post-cholecystectomy symptoms and divides them into 3 main groups: 1) symptoms due directly to the excision of the gallbladder or to deficiencies in diagnosis or surgery; 2) the late sequellae of the underlying biliary disease; and 3) symptoms which are completely unrelated to either the operation or the biliary tract. The first group includes the true functional post-cholecystectomy syndrome, due to disruption in function and dynamics of the biliary tract following loss of the gallbladder, which is quite rare (3 of 145 cases) and usually disappears within a year. This group also includes missed stones, especially of the common bile duct, which are often complicated by cholangitis, stenosis of the papilla of Vater, chronic pancreatitis with stenosis of the common bile duct, the cystic stump syndrome, and postoperative strictures or fistulae. The 2nd group includes the late consequences of chronic cholangitis, cholangiohepatitis, cholangitic cirrhosis, and chronic recurrent pancreatitis. Finally, the 3rd group, consisting of diseases which may lead to a misdiagnosis of post-cholecystectomy syndrome even though unrelated to the biliary tract, includes peptic ulcer, hiatus hernia, kidney disease, and spondylosis or osteochondrosis of the thoracic vertebrae.

3629 ABSENCE OF INTRAHEPATIC BILIARY DUCTS IN INFANTS.

(Fr.) Thomassin, N. (Parrot-Bicêtre Hosp., Paris, France). *Gaz. Med. de France* 75(3):579-586, 1968.

The syndrome of absence of intrahepatic biliary ducts in infants (MacMahon-Thannhauser) was studied in 20 patients. The syndrome is characterized by a chronic cholestasis whose clinical manifestations are: jaundice; urine and feces discoloration; pruritus; enlargement of the liver; cutaneous xanthomata; and occasional lipoid deposits in some visceral organs. Laboratory tests reveal biliary pigments in the urine, stercobilinogen in the feces, normo- or hypochromic anemia, hypocalcemia, increased sedimentation rate, and an increase in serum globulin. The hepatic tests show elevated transaminase levels, prolonged sulfobromophthalein elimination, increased lipemia, and increased alkaline phosphatase activity. Histologically, the main finding is the complete absence of interlobular biliary ducts. There is cholestasis, both intra-cellular and intra-capillary. The portal spaces show signs of inflammation: mononuclear infiltration and fibrosis. Kupffer cells are hypertrophic. The hepatocytes show pyknosis, vacuolization, nuclear changes, granulation, hyalinization, and even necrosis. Diagnosis should be based on the histological finding and the exclusion of hemolysis, metabolic jaundice, and neonatal hepatitis. In the initial stages, the cholestasis is intermittent but later becomes permanent. This results in intestinal malabsorption and steatorrhea which may cause delay in growth and ossification, hypocalcemia, dental disorders (multiple caries), and occasionally rickets. The treatment should include corticosteroids, orotic acid, sorbitol, vitamins A, D, K_1 (parenterally), calcium, cholestyramine (for pruritus control), and antibiotics if necessary. Diets rich in polyunsaturated fats can be beneficial. Surgical treatment consists of creating a biliary drainage (by cholecystojejunostomy or through the sphincter of Oddi; success depends on whether the extrahepatic biliary ducts persist or are atresic. The ethiopathogenesis of the syndrome is not clear. Some evidence indicates viral etiology. It is thought that the absence of intrahepatic biliary ducts does not result from agenesis, but from atresia secondary to a viral destruction of the biliary ducts, from vascular or hereditary disorders or from autoimmune processes.

3630 THE COMMON BILE DUCT AFTER CHOLECYSTECTOMY: COMPARISON OF COMMON BILE DUCTS IN PATIENTS WHO HAVE INTACT BILIARY SYSTEMS WITH THOSE IN PATIENTS WHO HAVE UNDERGONE CHOLECYSTECTOMY.

(E.) Mahour, G. H. (Mayo Grad. Sch. Med., Rochester, Minn.), K. G. Wakim, D. O. Ferris and E. H. Soule. *Ann. Surg.* 166(1):964-967, 1967.

External diameters and internal circumferences of the common bile duct are compared in autopsy findings of Group I, 100 patients with intact biliary systems, and Group II, 20 cholecystectomized patients, without exploration of the common duct. Cholecystectomy in Group II patients had been performed for chronic or acute cholecystitus, with or without cholelithiasis. Histological studies of the common duct were performed. Age, body weight, body length and sex were recorded. Ratios of these parameters to external diameter and internal circumferences were determined. In Group I, external diameter averaged 7.39 mm (4-12 mm), and internal circumference averaged 15.0 mm (7.5-24 mm). No ratio was found between these values and body weight or body length. External diameters increased 0.43 mm in females and 0.32 mm in males, and the internal circumference increased 0.86 mm in females and 0.70 mm in males for each 10 yr increase in age. Twelve out of 100 patients had sparse smooth muscle fibers in the wall with no correlation between age and presence or absence of smooth muscle. In Group II, mean age was 66 yr; survival after cholecystectomy was 17 yr. Outer diameters averaged 8.5 mm; internal circumferences averaged 17.22 mm. Four out of 20 patients had smooth muscle similar in appearance to that of Group I. In Group II, glandular structures having a possible absorptive function were more numerous, deeper, and showed proliferation, in some patients, into the ducts adventitia. No difference was found in nerve fibers, ganglionic cells, and vessels in the 2 groups. These autopsy findings suggest that there is no dilitation of the common bile duct after cholecystectomy in human beings, proliferation of intra-mural gland-like structures being the only structural change.

3631 PRIMARY STENOSING ("SCLEROSING") CHOLANGITIS: A CONTRIBUTION TO THE DIFFERENTIAL DIAGNOSIS OF HEPATIC DUCT OBSTRUCTION.

(Ger.) Sickinger, K. (Med. Clin., U. Göttingen, Germany) and W. Creutzfeldt. *Acta Hepatosplen. (Stuttgart)* 15(3):153-165, 1968.

Detailed case reports are presented for 3 patients (1 man and 2 women, 20-41 yr old) with primary stenosing cholangitis seen between 1962 and 1966. All 3 showed the clinical signs of obstructive jaundice in the presence of an empty gallbladder, and in 2 cases the correct diagnosis was provided by percutaneous transhepatic cholangiography. In the 3rd case, however, this test yielded a false-negative result, producing a misdiagnosis of primary biliary cirrhosis; due to development of an anastomosis between an intrahepatic bile duct and a fairly large vein, this patient developed severe jaundice which showed repeated transitory improvement in response to treatment with antibiotics and prednisone (up to 100 mg/day). Eventually, however, she died of pneumonia following hemorrhage from a steroid-induced ulcer. One of the other 2 cases showed increased jaundice during prednisone therapy, but the patient was cured by a cholecystectomy and right hepaticojejunostomy. The other patient was treated by cholecystectomy plus bougienage of the hepatic duct; despite temporary success, recurrent stenosis was found to be inoperable and the patient died. Based on these 3 cases and a review of the 36 cases in the literature (44 refs.), the authors conclude that the disease can affect all parts of the extrahepatic biliary tract, although the hepatic duct is most commonly involved. Although percutaneous transhepatic cholangiography is a useful technique, precise localization of the site of obstruction is only possible after laparotomy, and carcinoma of the liver can only be excluded definitely by biopsy. The disease is sometimes found in association with collagen diseases, diseases of the lymphatic system, ulcerative colitis and regional enteritis, but the etiology remains unclear. Anastomosis of the hepatic duct or dilatation of the stenosis by bougienage should be followed by prolonged corticosteroid therapy. The prognosis after successful surgical intervention is good, but otherwise the disease tends to progress to secondary biliary cirrhosis and liver failure.

3632 IMPULSE REFLECTION PASSAGE ULTRASONIC METHOD IN THE DIAGNOSIS OF BILE STONES.

(E.) Smoldas, J. (Med. Fac., Palacky U., Olomouc, Czechoslovakia). *Rev. Czech. Med.* 14(2):73-78, 1968.

A modification of the impulse reflection ultrasound method for the diagnosis of gallstones using 2 electroacoustic transducers, 1 acting as an emitter of the ultrasonic waves and the other acting as a receiver is described. This method renders possible the detection of echos from stones in the fundus of the gallbladder when the fundus is in contact with the anterior abdominal wall, a distinct advantage over the impulse reflection method using a single electroacoustic transducer. Analysis of oscillograms is simpler and more unequivocal with the newer method. The ultrasonic instrument must be set for optimal sensitivity to avoid erroneous results. No echos were detected from the biliary pathways in 60 healthy subjects. The area above gallstones incorporated into tissue models had a markedly greater reflectance than the surrounding tissue. The reflection of waves from gallstones by this method is mainly dependent on the shape and composition of their surface layers.

3633 IS THE GALLBLADDER'S RESERVOIR FUNCTION IMPORTANT AFTER SMALL BOWEL RESECTION?

(E.) Jordan, P. H. (VA Hosp., Houston, Texas), R. Olson and R. Paige. *Surgery* 64(2):446-450, 1968.

After *in vivo* measurement of the small intestine, the proximal half was removed in 2 female mongrel dogs, and the distal half in 2 others. Three consecutive 5-day fat balance studies were performed; each dog was offered 96 calories per kg per day, which included 4 g of fat per kg per day. Unconsumed food was weighed and analyzed for fat content; this amount of fat was subtracted from the total given. Daily stool specimens were also collected and analyzed for fat content. After the third study period, all dogs were cholecystectomized and allowed 3 weeks recovery. The dietary regimen was repeated for 3 periods, after which the remaining gut in each dog was remeasured *in vivo* and *in vitro*. Fat excretion is greater after distal small bowel resection than proximal resection; fat excretion increased moderately, but significantly, after cholecystectomy in ileectomized but not jejunectomized animals. Gallbladder reservoir function does contribute to bile salt conservation in the interdigestive period and to improve fat absorption in ileectomized dogs, however, ileal bile salt conservation is so great that gallbladder conservation is inconsequential regardless of ileal presence or absence.

3634 ROENTGENOLOGIC STUDY OF THE BILIARY TRACT DURING SURGERY.

(Rus.) Aripov, U. A. (Tashkent Med. Inst., USSR), P. N. Mazaev and E. V. Grishkevich. *Med. Zhur. Uzbek* (4):8-13, 1968.

3635 EVALUATING THE EFFECTS OF BILIARY TRACT SURGERY BY X-RAY TELEVISION.

(Rus.) Mazaev, P. N. (Tashkent Med. Inst., USSR), V. A. Aripov, E. V. Grishkevich, M. V. Danilov and V. A. Vishnevskii *Med. Zhur. Uzbek* (4):51-56, 1968.

3636 NONTRAUMATIC HEMOBILIA DUE TO CHOLECYSTITIS WITH HEMOCHOLECYST;

AN UNUSUAL CAUSE OF UPPER GASTROINTESTINAL BLEEDING. *(E.)* Michel, S. L. (Cedars-Sinai Med. Ctr., Los Angeles, Calif.) and P. Desser. *Amer. Surg.* 34(6):419-422, 1968.

3637 **BACTERIA IN THE COMMON HEPATIC DUCT IN PATIENTS UNDERGOING CHOLECYSTECTOMY.** *(E.)* Cuschiere, A. (David Lewis Northern Hosp., Liverpool). *Brit. J. Clin. Pract.* 22(5):201-202, 1968.

3638 **DIGESTIVE DISEASE AS A NATIONAL PROBLEM. V. GALLSTONES.** *(Rev.)(E.)* Ingelfinger, F. J. (10 Shattuck St., Boston, Mass.). *Gastroenterology* 55(1):102-104, 1968.

3639 **CONCERNING MOVEMENT OF THE BILE INTO THE INTESTINE DURING PAUSES IN DIGESTION.** *(Rus.)* Gubar, A. V. (2nd Pirogov Moscow Med. Inst., USSR). *Fiziol. Zh. SSSR* 54(6):720-726, 1968.

3640 **ALIMENTARY PRODUCTION OF GALLSTONES IN HAMSTERS.** *(E.)* Dam, H. (Dept. Biochem., Polytech. Inst., Copenhagen, Denmark). *Z. Ernaehrungswiss* 9(1):43-48, 1968.

3641 **PHOSPHOLIPIDS IN HUMAN HEPATIC BILE, GALLBLADDER BILE, AND PLASMA IN CASES WITH ACUTE CHOLECYSTITIS.** *(E.)* Gottries, A. (U. Goteborg, Sweden), S. Nilsson, B. Samuelsson and T. Schersten. *Scand. J. Clin. Lab. Invest.* 21(2):168-176, 1968.

3642 **PATTERNS OF DISTRIBUTION OF SULFOBROMOPHTHALEIN IN LYMPH AND BLOOD DURING OBSTRUCTION TO BILE FLOW.** *(E.)* Witte, M. H. (St. Louis, Mo.), A. E. Dumont, N. Levine and W. R. Cole. *Amer. J. Surg.* 115(1):69-74, 1968.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available, free to qualified interested investigators and practitioners, citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology has accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis and Metabolic Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

GASTROENTEROLOGY ABSTRACTS and CITATIONS is published monthly and includes citations and abstracts from the biomedical world literature as they are currently received. In addition, yearly cumulated subject and author indexes are published. Requests from qualified individuals to receive free copies of this publication, and address changes and other communications from these individuals should be addressed to:

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	mC, μC	milli-, microcurie(s)
ADP	adenosine diphosphate	mg	milligram(s)
AMP	adenosine monophosphate	min	minute(s)
ATP	adenosine triphosphate	ml	milliliter(s)
BSP	sulfobromophthalein	mm	millimeter(s)
C	degrees centigrade	MTD	maximum tolerated dose
cm	centimeter(s)	ng	nanogram (10^{-9})
CNS	central nervous system	pg	picogram (10^{-12})
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	ppm	parts per million
e.g.	for example	r	Roentgen
g	gram(s)	RBC	red blood cells (erythrocytes), red blood count
μg	microgram(s)		
hr	hour(s)	resp.	respectively
i.m.	intramuscular	Rev.	review (only in citations)
i.p.	intraperitoneal	RNA	ribonucleic acid
IU	international unit(s)	s.c.	subcutaneous
i.v.	intravenous	sec	second(s)
kg	kilogram(s)	SGOT	serum glutamic-oxalacetic transaminase
LD$_{50}$	median lethal dose(s)	SGPT	serum glutamic-pyruvic transaminase
LDH	lactic acid dehydrogenase	U	unit(s)
m	meter(s)	UV	ultraviolet
M	molar	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mM	millimolar	yr	year(s)
μM	micromolar		

SPECIAL NOTICE

The fifth issue of Gastroenterology Abstracts and Citations, dated May 1968 contains current coverage of the literature.

Due to circumstances beyond our control a lapse in publication of several months occurred early this year. Every effort is being made to again have the dated issues appear currently by the end of 1969. We trust that the publication will continue to be a useful tool for the gastroenterologists and that the discrepancy between the date on the publication and its later appearance will not be too troublesome.

3668 VITAMINS, SUGARS, AND ETHANOL METABOLISM IN MAN. *(E.)* Pawan, G. L. S. (Middlesex Hosp. Med. Sch., London, England). *Nature* 220(5165):374-376, 1968.

A study was made of the effects of vitamin and sugar supplements on the rate at which standard doses of alcohol were metabolized in 15 healthy male volunteers. Ethanol (0.5 g/kg body weight) was given orally at intervals of 3-5 days. Venous blood and urine samples were collected at ½ hr intervals for triplicate analysis of ethanol and water. Subjects were then given vitamin supplements daily for 10 days: thiamine hydrochloride (B1), 10 mg; riboflavin (B2), 4 mg; nicotinamide (PP), 40 mg; pyridoxine hydrochloride (B6), 4 mg; ascorbic acid (C), 200 mg; retinol (CA), 5000 IU; calciferol (D), 2 mg; and tocopherols (E), 20 mg. The ethanol experiments were repeated on the 5th and 10th day of vitamin supplements. The vitamin supplements had no effect on the rate of alcohol metabolism. The alcohol experiments were repeated at intervals of 3-5 days in 12 subjects who took 30-g doses of sugars (glucose, fructose, galactose, and sucrose) with the alcohol. Glucose and galactose had no effect. Fructose produced a significant (18-40%) increase, and sucrose a slight increase, in the rate of alcohol metabolism. The effect which was observed for sucrose is probably due to its fructose moiety.

3669 TRANSMEMBRANE ELECTRICAL POTENTIAL DIFFERENCES AND IONIC COMPOSITION OF MUCOSAL CELLS OF RAT COLON. *(E.)* Edmonds, C. J. (U. Coll. Hosp. Med. Sch., London, England) and O. E. Nielsen. *Acta Physiol Scand* 72(3):338-349, 1968.

The intracellular content of Na, K, Cl, and water, and the stable electrical potential differences (p.d.) across the cell membranes of mucosal cells of rat colon, were measured *in vivo* and *in vitro*. The serosal transmembrane p.d. was slightly greater than the luminal transmembrane p.d. with the inside of the cell being more negative than the exterior of the cell in both cases. Intracellular Na was lower and intracellular K was higher than extracellular fluid values of these ions, but the transmembrane p.d. measurements were much less than expected if they were simply due to K diffusion potentials. Na and K pumps were thought to be present at the serosal side of the mucosal cells. Since transmembrane fluxes of Na and Cl were inconsistent with the observed transmembrane potentials and the cellular ionic composition, it is felt that the bulk of these ions cross the mucosa either through special cells or by intercellular pathways.

3670 BLOOD FLOW AND FLOW DISTRIBUTION IN THE SMALL INTESTINES OF THE RAT AS ANALYSED BY THE Kr^{85} WASH-OUT TECHNIQUE. *(E.)* Kampp, M. (Dept. Physiol., U. Gőteborg, Sweden) and O. Lundgren. *Acta Physiol Scand* 72(3):282-297, 1968.

Blood flow and flow distribution in the small intestine of the cat were studied at various levels of vascular smooth muscle tone by the ^{85}Kr wash-out technique. In the resting state, 80% of the flow was distributed to the mucosa-submucosa, the flow rate being 40-80 ml/min/100 g. Blood flow in the muscularis was 10-20 ml/min/100 g. As total intestinal blood flow was increased by intra-arterial infusion of isopropylnorepinephrine, an increasingly larger portion of the total intestinal blood flow was distributed to a highly vascularized portion of the intestine located in the submucosa and adjacent parts of the mucosa. During intense vasodilatation with a total intestinal blood flow of 225 ml/min/100 g, 60% of the total flow passed through the highly vascularized submucosal bed, amounting to 800-1000 ml/min/100 g. Blood flow in the remaining portions of the submucosa-mucosa increased to 150-200 ml/min/100 g and increased in the muscularis to 35-40 ml/min/100 g.

3671 ON THE COMPONENTS OF THE Kr^{85} WASH-OUT CURVES FROM THE SMALL INTESTINE OF THE CAT. *(E.)* Kampp, M. (Dept. Physiol., U. Göteborg, Sweden), O. Lundgren and J. Sjöstrand. *Acta Physiol Scand* 72(3):257-281, 1968.

The wash-out of intra-arterially injected ^{85}Kr from denervated small intestinal segments of the cat was recorded by means of a scintillation detector at various levels of vascular tone. The elimination curve obtained was resolved into 4 components at all blood-flow levels. A probable localization of the 4 components was achieved on the basis of registration of the elimination of β-activity, local injections into different parts of the intestinal segment, autoradiography, and comparisons of weights of the compartments. The 1st component reflected a countercurrent exchange of ^{85}Kr between the ascending and descending limbs of the vascular loops in the mucosa at resting flow levels. With vasodilatation, this component reflected the wash-out of the tracer from a well-perfused region in the mucosa-submucosa, the 2nd and 3rd components reflected the disappearance of ^{85}Kr from the mucosa and the muscularis, resp. The 4th component, which was the slowest, reflected elimination of ^{85}Kr from the perivascular mesenteric fat and tracer absorption from the intestinal lumen.

3672 THE RELATIVE TOLERANCE OF THE DOG TO INTRAVENOUS INFUSIONS OF PANCREATIC JUICE. *(E.)* Dimbiloglu, M. E. (Hahnemann Med. Coll., Philadelphia, Pa.), H. E. Appert, J. M. Howard and F. W. Pairent. *Surgery* 64(4):805-813, 1968.

The tolerance of the dog to i.v. pancreatic juice and the hypotensive effects of pancreatic juice, collected from one dog and infused i.v. into a second dog, were studied in order to clarify the pathogenesis of the hypotension which frequently accompanies acute pancreatitis. Secretin (0.5 U/ml) was given i.v. at 5-10 ml/min to 6 fasting, unanesthetized donor dogs during collection of pancreatic juice (for periods of 2-4 hr at 2-3 day intervals). Recipient dogs (total of 29) received either repeated injections of pancreatic juice at 15-min intervals (total of 70-220 ml in 8-18 injections), continuous infusions of pancreatic juice (2 ml/min in 200-300 ml 5% glucose) for 25-40 min, a single injection of 50-400 ml of pancreatic juice at a rate of 50 ml/min, repeated single rapid injections once a week for 9-13 weeks, or single injections of dilute duodenal juice (90 ml). In some of the experiments, the pancreatic juice was first activated by addition of a crude enterokinase preparation (duodenal extract). Injection of 5-10 ml of pancreatic juice collected on ice caused minimal changes in blood pressure, but larger amounts collected at room temperature, particularly after activation, caused variable degrees of hypotension. However, there was no relation between the degree of hypotension and the trypsin content of the injected pancreatic juice, so that some agent other than trypsin (possibly kallikrein) may be responsible for the hypotensive effect. Infusions or repeated injections of small amounts of pancreatic juice also produced increased diuresis, fever, a decrease in serum calcium, and increases in serum chloride, amylase and lipase, but no permanent damage to health. Rapid injection of 140 ml of activated pancreatic juice led to death in one animal. However, duodenal juice alone also led to death in 2 of 8 dogs, and was generally more toxic than pancreatic juice. It is concluded that the hypotension encountered in acute pancreatitis is probably not the result of normal pancreatic juice absorption.

3673 **GLUCOSE METABOLISM IN THE MUCOSA OF THE SMALL INTESTINE: A STUDY OF HEXOKINASE ACTIVITY.** *(E.)* Srivastava, L. M. (Dept. Med. Biochem. Pharm., U. Birmingham, England), P. Shakespeare and G. Hübscher. *Biochem J* 109(1):35-42, 1968.

The subcellular distribution of hexokinase activity and the effects of starvation and refeeding on the types and amount of hexokinase in the intestinal mucosa were studied in 200-250 g male Wistar rats and adult guinea pigs of either sex. Altogether, 60% of the total hexokinase activity in the rat and 45% in the guinea pig was found in a particulate fraction containing only 5-17% of the total hexose phosphate isomerase, pyruvic kinase, lactic dehydrogenase, and overall glycolytic activities. The hexokinase activity in the particulate fraction was chiefly localized to the mitochondria, with only a small portion in the nuclei plus brush-border fraction. DEAE-cellulose chromatography of the supernatant confirmed the presence of two types of hexokinase. Preparations from rats and guinea pigs gave values of 5.8% and 69%, resp., for type I hexokinase and 94.2% and 31%, resp., for type II hexokinase. There was no evidence for type III hexokinase or glucokinase. Hexokinase activity decreased significantly in both the total homogenates and the supernatants of intestinal mucosa from rats starved for 36 hours, and increased again after the rats were refed. This decrease in activity resulted primarily from a decrease in type II enzyme.

3674 **CONTRIBUTION OF BILE TO RADIATION-INDUCED SODIUM LOSS VIA THE RAT SMALL INTESTINE.** *(E.)* Forkey, D. J. (Div. Radiat. Biol., U. Washington, Seattle), K. L. Jackson and G. M. Christensen. *Int J Radiat Biol* 14(1):49-57, 1968.

Studies in adult male Sprague-Dawley rats subjected to whole-body X-irradiation at 28-30 r/min (total dose of 600-1500 r) showed that prior ligation of the bile duct had no significant effect on the DNA content of the small intestinal mucosa 24-72 hr after irradiation. This is interpreted to mean that the presence of bile has no measurable effect on the extent or rate of loss or rate of repair of the mucosa. *In vivo* studies of net sodium transport also indicated that the presence of bile is not a prerequisite for sodium leakage across the irradiated intestinal mucosa, and that bile acids in the intestine have no significant effect on the rate of such leakage. Leakage of sodium from blood to intestinal lumen was significant 3 days after irradiation (1500 r) in both bile-duct-ligated and sham-operated rats. Furthermore, sodium absorption in normal rats was the same after intraintestinal administration of either saline or sodium taurocholate. These findings, together with the fact that the larger amount of sodium accumulating in the intestines of sham-operated animals could be accounted for by the sodium entering the intestine with the bile (0.28 mEq/4 hr), indicate that the major contribution of bile to intestinal sodium loss in radiation sickness is the secretion of sodium into an intestine which is incapable of carrying out net sodium absorption.

3675 **METABOLIC EFFECTS OF GLUCOSE INFUSION IN MAN.** *(E.)* Svedmyr, N. (Dept. Pharm., U. Gothenburg, Sweden). *Acta Physiol Scand* 73(4): 407-410, 1968.

The potential importance of the hyperglycemic effect of epinephrine for its caloric action was studied in 5 healthy male subjects (23-31 yr old). Glucose was infused i.v. at 0.005 g/kg/min for 30 min (total dose 22 g), increasing the blood glucose concentration to 78 ± 4.2 mg/100 ml. Infusion of epinephrine (0.10 μg/kg/min for 30 min) resulted in a blood glucose concentration of 54.0 ± 4.3 mg/100 ml. The oxygen consumption was not stimulated during or after glucose infusion, although CO_2 elimination and the respiratory quotient did increase. The free fatty acid content in the plasma decreased but the lactate concentration in the blood was not altered. It is concluded that the hyperglycemic effect of epinephrine is of no importance for its calorigenic action.

3676 **BODY IRON EXCRETION IN MAN: A COLLABORATIVE STUDY.** *(E.)* Green, R. (U. Witwatersrand Med. Sch., Johannesburg, South Africa), R. Charlton, H. Seftel, T. Bothwell, F. Mayet, B. Adams, C. Finch and M. Layrisse. *Amer J Med* 45:336-353, 1968.

Various isotopic (^{55}Fe, ^{59}Fe, ^{51}Cr) and chemical methods were used to quantify iron losses in a collaborative study of 60 adult male volunteers of different ethnic groups, ranging in age from 21-65 yr; the subjects were selected to determine the effects of iron storage status, physical activity, and climatic conditions on body iron excretion. Calculated daily iron losses averaged 0.95 mg in American white subjects, 0.90 in Venezuelan Mestizos, 2.42 in Johannesburg Bantu, 1.02 in Durban Indians, and 2.01 in Durban Bantu; the higher levels found in Bantu subjects were attributed to greater than normal iron storage in this population group. Perspiration was eliminated as a major route of iron excretion due to the similarity of losses in white subjects involved in moderate physical activity and individuals working under conditions of extreme heat and humidity. Iron losses from the gastrointestinal tract were measured in desquamated mucosal cells and feces; this amount equalled 0.1 mg/day. Iron levels were also determined in bile, urine and skin. A peak in biliary iron content was observed 72 hr after i.v. radioiron administration, after which time the level decreased sharply. No significant difference was seen between urine iron losses in normal and siderosis patients. Skin iron losses were expressed in percent per square meter. Skin from apocrine sites showed considerably higher radioiron uptake. However, since apocrine tissue comprises only 5% of total surface area, skin data is based on eccrine findings. Variations in individual subjects appear to be related to the percentage saturation of circulating transferrin; at low saturation, little or no iron enters the skin. Chemical data suggest that approximately 0.87 mg of iron is lost daily via the epidermis. Iron losses from different body compartments added together and compared with those obtained in long-term excretion studies were in close agreement in all groups except Bantu. Discrepancies were attributed to technical errors and routes of iron excretion not investigated in this study.

3677 CARBOHYDRASE ACTIVITIES IN THE BOVINE DIGESTIVE TRACT. *(E.)* Siddons, R. C. (Natl. Inst. Res. Dairying, Reading, England). *Biochem J* 108(5):839-844, 1968.

3678 CROSS-IMMUNITY STUDIES WITH o-AMINOAZOTOLUENE HEPATOMAS AND A SPONTANEOUS HEPATOMA IN MICE. *(Ger.)* Müller, M. (Inst. Path., Carl Gustav Carus Med. Acad., Dresden, Germany). *Arch Geschwulstforsch* 31(4):339-343, 1968.

3679 STUDY OF THE PHYSICAL-CHEMICAL STATE OF ^{90}Sr IN THE CONTENTS OF THE GASTROINTESTINAL TRACT. *(Rus.)* Frolova, Ie. I. (Moscow, USSR), Z. V. Dubrovina, Z. A. Bakhareva and N. I. Burov. *Biull Eksp Biol Med* 66(8):59-61, 1968.

3680 STUDIES ON BLOOD FLOW DISTRIBUTION AND COUNTERCURRENT EXCHANGE IN THE SMALL INTESTINE. *(E.)* Lundgren, O. (U. Goteborg, Sweden). *Acta Physiol Scand* (Suppl. 303):1-42, 1968.

3681 DISTINCTIONS BETWEEN INTESTINAL AND PLACENTAL ISOENZYMES OF ALKALINE PHOSPHATASE. *(E.)* Fishman, W. H. (Tufts U. Sch. Med., Boston, Mass.), N. R. Inglis and N. K. Ghosh. *Clin Chim Acta* 19(1):71-79, 1968.

3682 IMMUNOLOGICAL CHARACTERIZATION OF THE ISOENZYMES OF ALANINE AMINOPEPTIDASE. *(Ger.)* Peters, J. E. (Inst. Clin. Biochem., Martin-Luther U., Halle/Saale, Germany), N. Rehfeld, L. Beier and R. J. Haschen. *Clin Chim Acta* 19(2):277-286, 1968.

3683 AGAR-ELECTROPHORETIC STUDIES ON THE ISOENZYMES OF AMYLASE. *(Ger.)* Götz, H. (Med. Clin., U. Erlangen-Nuremberg, Germany), H. Wüst and F. Raies. *Clin Chim Acta* 19(2):235-243, 1968.

3684 STRUCTURES AND IMMUNOCHEMICAL PROPERTIES OF OLIGOSACCHARIDES ISOLATED FROM PIG SUBMAXILLARY MUCINS. *(E.)* Carlson, D. M. (Dept. Pediat., Case Western Reserve U., Cleveland, Ohio) and C. Blackwell. *J Biol Chem* 243(3):616-626, 1968.

3685 HUMAN ALKALINE PHOSPHATASE: IMMUNOCHEMICAL IDENTIFICATION OF ORGAN-SPECIFIC ISOENZYMES. *(E.)* Sussman, H. H. (Clin. Ctr., Natl. Inst. Health, Bethesda, Md.), P. A. Small Jr. and E. Cotlove. *J Biol Chem* 243(1):160-166, 1968.

3686 PROTEIN SYNTHESIS BY RAT INTESTINAL MUCOSA: THE ROLE OF RIBONUCLEASE. *(E.)* Alpers, D. H. (Harvard Med. Sch., Boston, Mass.) and K. J. Isselbacher. *J Biol Chem* 242(23):5617-5622, 1967.

3687 RAT SMALL-INTESTINAL β-GALACTOSIDASES: SEPARATION BY ION-EXCHANGE CHROMATOGRAPHY AND GEL FILTRATION. *(E.)* Asp, N. G. (Dept. Physiol. Chem., U. Lund, Sweden) and A. Dahlqvist. *Biochem J* 106(4):841-845, 1968.

3688 INVESTIGATIONS ON VITAMIN D ESTERS SYNTHESIZED IN RATS: TURNOVER AND SITES OF SYNTHESIS. *(E.)* Fraser, D. R. (Dunn Nutrit. Lab., U. Cambridge, England) and E. Kodicek. *Biochem J* 106(2):491-496, 1968.

3689 PRIMARY STRUCTURE OF BOVINE CARBOXYPEPTIDASE B. I. PREPARATION OF ENZYME FROM PANCREATIC JUICE. *(E.)* Kycia, J. H. (Biol. Dept., Brookhaven Natl. Lab., Upton, N. Y.), M. Elzinga, N. Alonzo and C. H. W. Hirs. *Arch Biochem* 123(2):336-342, 1968.

3690 PRIMARY STRUCTURE OF BOVINE CARBOXYPEPTIDASE B. II. TRYPTIC PEPTIDES FROM THE REDUCED, AMINOETHYLATED PROTEIN. *(E.)* Elzinga, M. (Biol. Dept., Brookhaven Natl. Lab., Upton, N. Y.) and C. H. W. Hirs. *Arch Biochem* 123(2):343-352, 1968.

3691 PRIMARY STRUCTURE OF BOVINE CARBOXYPEPTIDASE B. III. THE CARBOXYL-TERMINAL SEQUENCE. *(E.)* Elzinga, M. (Biol. Dept., Brookhaven Natl. Lab., Upton, N. Y.), C. Y. Lai and C. H. W. Hirs. *Arch Biochem* 123(2):353-360, 1968.

3692 PRIMARY STRUCTURE OF BOVINE CARBOXYPEPTIDASE B. IV. AMINO ACID SEQUENCE OF A DISULFIDE-CONTAINING LOOP. *(E.)* Elzinga, M. (Biol. Dept., Brookhaven Natl. Lab., Upton, N. Y.) and C. H. W. Hirs. *Arch Biochem* 123(2):361-367, 1968.

3693 GASTRIC BLOOD FLOW IN ANAESTHETIZED CATS. *(E.)* Harper, A. A. (Med. Sch., U. Newcastle upon Tyne, England), J. D. Reed and J. R. Smy. *J Physiol (London)* 194(3):795-807, 1968.

MORPHOLOGY AND CELLULAR STRUCTURE

694 **ON THE HISTOCHEMICAL DEMONSTRATION OF SULPHOMUCINS IN HUMAN AND CANINE ASTRIC EPITHELIUM.** *(E.)* Tyrkko, J. (Dept. Path., U. urku, Finland), I. Hakkinen and U. Rimpela. *Brit J Exp Path* 9(4):371-374, 1968.

issues prepared for mucin histochemistry were closely studied o resolve contradictory reports in the literature on the existence f gastric sulfomucins. Gastric mucosa specimens were taken rom the antrum and corpus immediately following gastrectomy n dogs fasted for 24 hr prior to surgery. Human specimens vere obtained by suction biopsy from four 20-yr-old untreated heumatoid arthritis patients. The canine specimens were fixed n 10% neutral formalin or in a 2:2:1 butanol-ethanol-distilled vater mixture. The human specimens were fixed in the butanol-thanol-H_2O mixture. The stains used to demonstrate sulfonucins were: 1) high iron diamine-alcian blue pH 2.5; 2) alcian lue pH 1; 3) alcian blue pH 1-PAS; and 4) aldehyde fuchsin-lcian blue pH 2.5. The presence of sulfomucins was demontrated. The sulfomucins were localized in the surface epithelium f both the canine and the human specimens fixed with the utanol-ethanol-H_2O mixture. In previous studies in which oncentrated neutral formalin was used to fix the specimens, ulfomucins could not be demonstrated.

3695 **HISTOCHEMICAL STUDY OF THE MUCOSUBSTANCES IN THE CANINE STOMACH. II. THE EFFECTS OF HISTAMINE, GASTRIN, URECHOLINE, AND FOOD.** *(E.)* Gerard, A. (New York Med. Coll., N. Y.), R. Lev and G. B. J. Glass. *Lab Invest* 19(1): 29-39, 1968.

The acute effects of bethanechol (Urecholine, 0.25-4.0 mg/hr i.v.), food ingestion (200 g of ground meat), histamine (0.75-3.0 mg/hr i.v.) and gastrin (10-20 mg s.c.) on the synthesis, distribution and extrusion of gastric mucosubstances were studied in 5 fasted dogs bearing total gastric fistulas. Histochemical techniques (staining with periodic acid-Schiff, Alcian Blue, high-iron diamine, aldehyde fuchsin, or Bowie's stain) and *in vivo* autoradiography (1.0 mC of $Na_2{}^{35}SO_4$ i.v.) were used to study biopsy specimens of the antral and fundic mucosa obtained without anesthesia. The results showed that Urecholine induces extrusion of mucus by the fundic crypt cells and the antral pyloric glands. Urecholine also induces the simultaneous discharge of pepsinogen and sulfated mucopolysaccharide from the chief cells. The effects of food ingestion are similar to, but more variable than, those of Urecholine. Administration of histamine or gastrin also resulted in increased synthesis of mucus by the fundic and antral crypt cells and pyloric glands, but without significant prior depletion of cytoplasmic mucus. Histochemical evidence suggests, in fact, that mucus discharge from deep crypt cells is inhibited by histamine or gastrin. The mechanism of these effects is unknown. There was considerable variability in the response of the individual glands in a single specimen.

3696 **THE FINE STRUCTURE OF PANCREATIC ACINAR AND HEPATIC PARENCHYMAL CELLS AFTER NEUTRAL RED DYE INJECTION.** *(E.)* Alousi, M. A. (Cleveland Metrop. Gen. Hosp., Ohio), R. J. Stenger and W. S. Morgan. *Exp Molec Path* 9(1):97-109, 1968.

The rates of evolution of Neutral Red granules in the pancreatic acinar and hepatic parenchymal cells were compared in male Swiss-albino mice given s.c. injections of 1.0-1.2 ml 1% Neutral Red; in addition, the sequential ultrastructural changes in the two cell types were determined by electron microscopy of specimens taken 15 min to 48 hr after injection. In both pancreas and liver, the development of autophagic vacuoles was the only subcellular finding that could be correlated with the appearance of the Neutral Red granules seen under the light microscope. In the early stage, these cytoplasmic vacuoles contained identifiable segments of endoplasmic reticulum; in the intermediate stage, the vacuoles contained partially digested segments of endoplasmic reticulum and mitochondria, giving rise to the term "composite bodies"; in the late stage, when the source material of the heterogeneous and osmiophilic vacuolar contents could no longer be identified, the vacuoles were called residual bodies. The evolution from autophagic vacuole (early stage) to residual body progressed more rapidly in the liver than in the pancreas. In the pancreatic acinar cells, however, these vacuoles represented the only significant cytoplasmic alteration, while in the liver it was accompanied by other cytoplasmic changes (glycogen depletion, lipid accumulation, and disorganization of the rough endoplasmic reticulum with dilatation of the cisternae). In both organs, the vacuoles disappeared and morphologic integrity was restored within 18 hr after injection of Neutral Red.

3697 **ORIGIN OF LYSOSOMES IN PARIETAL CELLS.** *(E.)* Winborn, W. B. (U. Tennessee Med. Units, Memphis) and D. E. Bockman. *Lab Invest* 19(3): 256-264, 1968.

The mechanism by which electron-dense bodies in gastric mucosal parietal cells of the golden hamster are formed was studied by routine and cytochemical electron microscopy using different fixation methods and observing stained and unstained sections. Frequently, 20 to 30 dense bodies were seen per cell section, appearing as lamellar, crystalloid, and granular forms. The granular forms revealed a heavy reaction product for acid phosphatase and contained ferritin-like particles. These dense bodies were morphologically similar to the lysosomes and residual bodies previously described. Observations suggested that the dense bodies may originate from mitochondria which are undergoing morphological alterations. A thickened surrounding membrane appears to be related to the changes in appearance of the mitochondria.

3698 **THE EFFECTS OF OESTROGENS AND OTHER STEROID HORMONES ON THE ULTRASTRUCTURE OF THE LIVER OF *XENOPUS LAEVIS* DAUDIN.** *(E.)* Nicholls, T. J. (Dept. Zool., U. Leeds, England), B. K. Follett and P. J. Evennett. *Z Zellforsch* 90(1):19-27, 1968.

Administration of estradiol-17β to *Xenopus laevis* resulted in considerable proliferation of the granular endoplasmic reticulum and an increase in the electron density of the nucleolus of all liver cells. Stored glycogen levels in the liver were decreased. Injection of pregnant mare serum gonadotrophin caused a similar response in intact females but not in males or ovariectomized females. This suggests an indirect humoral effect by stimulation of ovarian estrogen secretion. Estradiol benzoate, estrone and estriol were also able to effect similar responses. Testosterone propionate, progesterone, and cortisone acetate were without effect.

3699 ON THE LIPASE ACTIVITY IN THE CRYSTALLOIDS IN THE PANCREATIC ACINAR CELLS OF THE MOUSE.

(E.) Nagata, T. (1st Dept. Anat., Shinshu U., Japan), F. Murata and S. Yokota. *Med J Shinshu Univ* 13(1):23-33, 1968.

Inclusion bodies in the pancreatic acinar cells from 7 healthy albino mice were examined by electron microscopy for lipase activity after fixation in specialized media. The inclusion bodies observed were of 3 types: 1) filamentous mass without any crystalloids, 2) crystalloids without any surrounding filamentous mass, and 3) both crystalloids and filamentous mass. Lipase activity was located in the cisternae of the endoplasmic reticulum involved in the crystalloids, and in the junctional zones between the cytoplasmic matrices and the tubular elements which surround the crystalloids. No lipase activity was observed in the crystalloids themselves, whether surrounded by a filamentous mass or not. It is suggested that lipase located in the inclusion bodies play a role in the storage and discharge of lipids in and out of the inclusion bodies in accordance with the animal's nutritional status.

3700 THE INTERCONNEXIONS OF THE MUSCLE LAYERS OF THE HUMAN COLON.

(E.) Pace, J. L. (Dept. Anat., Royal U. Malta). *J Anat* 103(2):289-296, 1968.

The circular and longitudinal muscle layers of 112 human postmortem colons were examined microscopically after microdissection supplemented by preliminary enzymatic treatment with collagenase. The 2 muscle coats were closely bound together by both muscle and connective tissue. Longitudinal muscle fibers at the edges of a taenia changed direction suddenly and coursed towards and ultimately fused with the main circular muscle layer. This was more noticeable in the ascending and proximal portion of the transverse colon. Numerous irregular muscle fasciculi passed between the 2 layers. Continuity of the intermuscular connective tissue plane with the subserous tissue and the submucosa through the fibrous stroma of the muscle coats contributed to the interconnections. Muscular interconnections were present at, and in the intervals between, the taeniae. The interconnections between the 2 layers at the site of the taeniae account for the interhaustral clefts being limited to the areas between adjacent taeniae, but are not directly responsible for haustral cleft formation. Linkage between the 2 muscle layers at the edges of the taeniae appears to be a factor in assuring that rupture due to excessive distension always takes place through a taenia.

3701 GASTRIC MUCOSAL MAST CELLS IN THE COMMON LABORATORY ANIMALS AND MAN.

(E.) Ragins, H. (Albert Einstein Coll. Med., New York City) and S. M. Liu. *JAMA* 203(9):654-656, 1968.

Specimens of gastric corpus and antrum mucosa taken from 6 adult male frogs, 6 mice, 6 Sprague-Dawley rats, 5 Wistar rats, 6 male hamsters, 6 male pigs, 6 male rabbits, 6 male cats, 6 dogs of both sexes, and 3 humans (1 male and 2 females) were studied to determine their mast-cell content. Specimens were placed in a fresh Mota fixative. After drying overnight and washing with xylene and ethanol (100% and 95%), the slides were stained in 0.05% toluidine blue in 50% aqueous ether 181 which binds water and represses ionization, leaving ionizable sites available for dye binding only on the mast-cell granules. The technique stained the mast-cell granules metachromatically and their nuclei appeared various shades of blue. The distribution and density of the mast cells ranged from none in the frogs or rats to $19/mm^3$ in man (average) in the gastric corpus mucosa and 1127 ± 49 in the dog gastric corpus mucosa. There appeared to be no connection between the known sensitivity of the stomach of a given species to histamine stimulation and its mast-cell content. None of the species demonstrated a topographic association between mucosal mast cells and parietal cells. A role for endogenous histamine released from mucosal mast cells cannot be supported by the data of this study, but nonmast-cell histamine is the physiologically active agent.

3702 HISTOLOGICAL AND SECRETORY STUDIES OF EXPLANTED GASTRIC MUCOSA IN DOGS.

(E.) Thomford, N. R. (Mayo Grad. Sch. Med., U. Minnesota, Rochester) and D. C. McIlrath. *J Surg Res* 8(9):404-410, 1968.

Vagally denervated gastric mucosa was evaluated in 6 mongrel dogs as a subcutaneous Heidenhain pouch; then it was evaluated during a period of exteriorization (12-27 weeks) and finally after it was reestablished in the form of a pouch (5 dogs) or covered with a bridge of skin (6th dog). Fasting secretion was collected for 30 min, after which secretion was stimulated by betazole (4.5 mg/kg in a single injection) or during alternate bethanechol tests (0.4 mg/kg every 15 min for 2 hr). In all animals parietal cells were less abundant 2 days after exteriorization, and entirely absent by the 10th day. The surface mucosa was severely ulcerated at 3 days and covered with cuboidal epithelium after 21 days. The basic histological characteristics were restored 6-8 weeks after the explant was reestablished. Average betazole-stimulated secretion in the pouch studies ranged from 0.28-1.97 mEq/30 min (pH 1-2); bethanechol-stimulated secretion ranged from 0.38 to 2.27 mEq/30 min. During the period of exteriorization, the pH of betazole- and bethanechol-stimulated secretions fluctuated between 4 and 8 for 3 months, after which it became progressively more acid. Explanted mucosa was reestablished in the form of a pouch in 3 of 5 dogs. Average acid output due to betazole stimulation was 1.55 mEq/30 min (pH 1.0-2.5). The experiments demonstrate that vagally denervated gastric explants in dogs may be successfully reestablished in the form of a pouch.

3703 LIPID COMPOSITION OF THE ISOLATED RAT INTESTINAL MICROVILLUS MEMBRANE.

(E.) Forstner, G. G. (Massachusetts Gen. Hosp., Boston), K. Tanaka and K. J. Isselbacher. *Biochem J* 109(1):51-59, 1968.

Rat intestinal microvillus membranes were prepared from previously isolated brush borders and the lipid composition analyzed. The results indicated that the microvillus membrane contains approximately 600 μg lipid/mg protein. Of the total lipid, 20% was neutral lipid, 30% phospholipid, and 50% glycolipid. The neutral lipid content was 70.5% cholesterol and

29.5% fatty acids and glycerides. The high cholesterol:phospholipid molar ratio (1:26) is comparable to that reported for myelin. The phospholipids identified were phosphatidylethanolamine (39.5%), lecithin (20.7%), phosphatidylserine (14.0%), sphingomyelin (6.7%) and lysolecithin (1.7%). The absence of acid-hydrolyzable phospholipids suggests that the microvillus membrane contains very few plasmogen phosphatides. It is noted, however, that the hydrolytic method may give erroneously low estimates of tissue plasmogens in some cases and that it would be desirable to confirm these results by a method that is not dependent on acid lability. Glycolipids constituted the major portion of the membrane lipid. It was shown that the microvillus membrane has the most glycolipid and the least phospholipid when compared with liver cell, myelin and erythrocyte membranes. The comparison illustrated that the variability in the glycolipid and phospholipid content of these membranes is greater than that of the neutral lipid and suggests that the more polar fractions may vary reciprocally. It is possible that these gross variations in lipid content may reflect one manner by which specific functional characteristics are imparted to a particular membrane. More than 50% of the fatty acids in the polar (major) lipid fraction of the microvillus membrane were unsaturated but both cellular and membrane fatty acid composition could be altered by dietary change (linoleic acid content increased after safflower oil was given), while the overall proportion of saturated and unsaturated fatty acids in the cell and membrane remained unchanged. Membrane diglycerides differed markedly from cellular diglycerides in their saturated fatty acid content and relative resistance to linoleic acid incorporation. It is possible that the membrane contains specific glycerides that are important in membrane function or structure.

3704 **ELECTRON MICROSCOPIC STUDIES ON COMPOUND TUBULAR BODIES IN ACINAR CELLS OF CAT PANCREAS.** *(E.)* Legg, P. G. (Dept. Anat., Monash U., Victoria, Australia). *J Anat* 103(2):359-369, 1968.

Electron microscopic studies were performed on 15 healthy cats to determine the ultrastructure of the compound tubular bodies in the acinar cells of the pancreas, on 3 healthy cats to determine the acid phosphatase activity within the acinar cell using the Barka method, and on 3 healthy cats starved overnight and maintained in an anesthetic state for 100 days following extirpation of the celiac ganglia to determine the effects of anesthesia on ultrastructure. In these studies, little difference was found between the 2 methods of fixation (phosphate-buffered distilled 6% gluteraldehyde with post-fixation in osmium tetroxide, or 2.5% osmium tetroxide buffered with a potassium dichromate-calcium chloride mixture). In the normal animals it was found that the tubules (500-700 A in width and several microns long) are surrounded by a unit membrane, that they are embedded in a matrix which shows variation in electron density, and that the electron-dense layer of the tubular wall is trilaminar. Following bilateral celiac ganglionectomy, there was a decrease in the number of both the zymogen granules and the compound tubular bodies, supporting the view that these bodies may be involved in the synthesis or storage of zymogen granules. The compound tubular body does not show acid phosphatase activity and the absence of a reaction here is evidence against the lysosomal nature of this organelle; further investigations may reveal the presence of other acid hydrolases.

3705 **HISTOLOGIC AND FUNCTIONAL STUDIES OF EXPLANTED CANINE GASTRIC MUCOSA WITH VAGAL INNERVATION.** *(E.)* Coder, D. M. (Mayo Grad. Sch. Med., U. Minnesota, Rochester), R. G. Shorter and D. C. McIlrath. *Surgery* 64(4):769-774, 1968.

Four male mongrel dogs were studied to determine whether preservation of vagal innervation to gastric explants would prevent or retard the disappearance of identifiable parietal cells. Vagally innervated subcutaneous gastric pouches were examined to establish functional and histological control levels. After 6-12 weeks, the pouches were explanted and biopsies were similarly tested. After 1-3 months the explants were reformed into pouches, 2 being drained by cannulas, and the other 2 being provided with a mucocutaneous stoma to permit punch biopsy of the mucosa. The secretion of acid due to insulin-induced hypoglycemia demonstrated vagal innervation. Throughout the experiment, betazole (4.5 mg/kg) was given to induce acid secretion, and bethanechol (0.04 mg/kg every 15 min for 2 hr) to stimulate pepsin secretion. The loss of specialized gastric mucosal cells due to exteriorization, with replacement by mucus-secreting (pH = 8) cells, was demonstrated. Preservation of vagal innervation did not prevent the metaplasia. During the 2-3 weeks following explantation, the gastric glands became tortuous and cystic, the lamina propria became edematous and inflamed, parietal cells were not identifiable, and the explants were not responsive to either secretogogue. Reformation of a gastric pouch from the explant resulted in regeneration of parietal and chief cells and restoration of normal appearing mucosa within 10 weeks, which was first evidenced by the straight tubular appearance of the glandular structure 3-4 days after the operation. Four weeks later, parietal and chief cells were identified. Minimal acid secretion occurred as early as 4 days after reformation and usually 1-3 weeks later, indicating that parietal cell function was present before the cells could be identified.

3706 **CRYSTALLOID INCLUSION BODIES IN MITOCHONDRIA FROM HUMAN LIVER.** *(Ger.)* Spycher, M. A. (Inst. Histopath., U. Zurich, Switzerland) and J. R. Ruttner. *Virchow Arch Path Anat* 1(3):211-221, 1968.

Electron microscopy of liver biopsies obtained with the Menghini needle from 52 patients with known or suspected hepatic disease revealed 8 specimens with intramitochondrial paracrystalline inclusion bodies; these biopsy specimens were obtained from patients (22-56 yr old) with cholestasis and/or fatty infiltration of the liver (2 cases), hepatitis (2 cases), toxic hepatosis and jaundice (2 cases), lead poisoning, and hepatic lupus erythematosus. These inclusion bodies were well-defined systems of densely packed osmiophilic filaments which appeared to be orthorhombic in structure, having cross-sections with angles of 108 and 72°. They were found in two different types of mitochondria: in mitochondria with a dense matrix and many parallel cristae forming a constant angle of about 130° with the long axis of the inclusion body, and in mitochondria with a light matrix and few cristae. The chemical nature of the inclusion bodies remains unclear, although it is suggested that they may result from a disturbance in mitochondrial metabolism. They cannot be associated with any specific hepatic disease, and may be only a variation in normal mitochondrial structure.

3707 **THE FINE STRUCTURE OF BRUNNER'S GLANDS IN MAN.** *(E.)* Leeson, T. S. (Dept. Anat., U. Alberta, Edmonton, Canada) and C. R. Leeson. *J Anat* 103(2):263-276, 1968.

The fine structure of Brunner's gland cells obtained by biopsy from the normal duodena of six fasting patients (37-68 yr old) was investigated by electron microscopy. Brunner's glands, lying mainly in the submucosa but also penetrating the muscularis mucosae, are composed of cuboidal to columnar secretory cells which are typically mucous but vary morphologically due to differences in the secretory phase; there are also numerous argentaffine cells interspersed among the secretory cells. The nuclei of cells with a high content of secretory material are dark, irregular, and basally located, often to one side of the cell, while the nuclei of cells with a low content of secretory material are either spherical or oval, regular, less densely packed with chromatin, and, although basal, usually further removed from the basal plasma membrane; the latter type sometimes contain a fibrous lamina internal to the nuclear envelope. The most prominent organelle is an extensive, often multiple, Golgi apparatus bounded by curving, closely packed lamellae of smooth membranes. In cells containing abundant secretory material the Golgi elements are often dilated and mitochondria are few, small, and principally basally located, while in cells containing less secretory material the lamellae have narrow lumina, microvesicles are more numerous, large vacuoles are infrequent, and there are more and larger mitochondria with prominent cristae, concentrated in the basal cytoplasm. In all cells, the mitochondria are closely related to the granular endoplasmic reticulum or ergastoplasm. Free ribosomes are prominent. Large, complex, secretory mucin droplets are the most prominent features of the secretory cells. Although their content varies with the secretory cycle, all droplets contain a fine fibrillar component. Membranes bounding these droplets are absent in many instances. A comparison of these findings with previous reports in the literature confirms that species differences do exist in the structure of the duodenal glands.

3708 **GASTRIC MUCOSAL INTRACELLULAR LOCALIZATION OF GASTRIN BY IMMUNOFLUORESCENCE.** *(E.)* McGuigan, J. E. (Washington U. Sch. Med., St. Louis, Mo.). *Gastroenterology* 55(3):315-327, 1968.

Immunofluorescent techniques, involving the use of fluoresceinated antibodies directed against antigenic determinants of human gastrin I, were utilized to study human and porcine mucosa from the antrum and body of the stomach. Human specimens were obtained by biopsy from 2 normal adult males, ages 30 and 32. Gastrin was identified in interspersed, differentiated, mucosal epithelial cells of the antral pyloric gland of both human and porcine antral mucosa. Immunofluorescent cells were similar, with regard to distribution and morphology, to certain enterochromaffin cells but they could not be identified as either argentaffin or argyrophil cells. When extracts of the porcine mucosa were measured radioimmunochemically, there were excellent correlations between the presence of large amounts of gastrin in extracts from antral mucosa and numerous specifically immunofluorescent cells in that region, and between the extremely small amounts of gastrin in extracts from mucosa of the body of the stomach where only very rare immunofluorescent cells could be identified.

3709 **INTERFEROMETRIC AND CYTOPHOTOMETRIC STUDIES ON RAT LIVER NUCLEI AFTER STARVATION AND REFEEDING.** *(Ger.)* Hobik, H. P. (Inst Exp. Path., Bayer Dyeworks, Wuppertal-Elberfeld, Germany), E. Hobik and E. Grundmann. *Beitr Path Anat* 137(2):184-202, 1968.

Interferometric and cytophotometric investigations were performed on nuclei from the livers of 18 white rats that had survived a 7-day starvation period (water ad libitum) during which 30 had died. The surviving animals were divided into 4 groups. The first group was sacrificed immediately, the second group after feeding for 2 days, the third group after feeding for 3 days and the fourth group after feeding for 5 days. An additional 6 animals had been given a normal diet and served as controls. At the end of the test, the surviving animals had lost 34.8% of their body weight and 54.1% of their liver weight. After the animals had been refed for 2 days their original body weight was reestablished and the mean liver weight had risen from 45.9% of normal to 73.3%; this became 87.6% after 3 days and 97.6% after 5 days of refeeding. The livers from 3 animals of each group were prepared for study with the double-beam interference microscope. The cell nuclei were isolated, freeze-dried and taken up in liquid paraffin. The mean dry mass after 7 days' starvation was reduced by 29%, but normal values were obtained after only 2 days' feeding. The cell volume showed the same changes so that the relative nuclear mass remained essentially constant. Other parts of the liver were embedded in paraffin and Feulgen stained. Cytophotometric studies showed that the mean DNA content of the liver cell nuclei did not vary during either starvation or refeeding. The increase in "intermediate classes" between the main classes of polyploidy of the rat liver is regarded as a consequence of DNA synthesis. Almost a third of the nuclear protein is variable and apparently not structurally bound.

3710 **THE DISTRIBUTION OF INTRAVASCULARLY ADMINISTERED LIPID SOLUBLE AND LIPID INSOLUBLE SUBSTANCES IN THE MUCOSA AND THE SUBMUCOSA OF THE SMALL INTESTINE OF THE CAT.** *(E.)* Kampp, M. (Dept. Physiol., U. Goteborg, Sweden), O. Lundgren and J. Sjostrand. *Acta Physiol Scand* 72(3):469-480, 1968.

The distribution of intra-arterially injected, lipid-soluble, antipyrine-^{14}C (25 μC dissolved in 0.3-0.8 ml saline) and lipid-insoluble urea-^{14}C (50 μC in 0.3-0.8 ml saline) in the mucosa and submucosa of the small intestine of 24 cats was investigated by autoradiography at various levels of total intestinal blood flow. At a "resting" flow level, a comparatively low concentration of both tracers was noted in the villi 5 sec after isotope administration. The difference in concentration between crypts and villi was most pronounced for antipyrine-^{14}C. It was demonstrated that the 2 tracers were eliminated slowly from the tips of the villi at "rest". When the intestinal vascular bed was dilated by isopropylnorepinephrine, the concentration of the tracers immediately after injection seemed more or less constant throughout the mucosa. The rate of wash-out of the two tracers from the villi was constant. The distribution of intra-arterially infused, lipid-soluble, 4-iodoantipyrine and lipid-insoluble rubidium was also determined in 3 or 4 transverse sections of the villi. Results consistent with those described above were obtained. The findings suggest the existence of countercurrent exchange, particularly of lipid-soluble substances, between the ascending and descending limbs of the mucosal vascular loops located in the villi.

3711 EFFECT OF METHACHOLINE ON PANCREATIC AMYLASE SYNTHESIS. *(E.)*

Webster, P. D. III (Med. Coll. Georgia, Augusta). *Gastroenterology* 55(3):375-385, 1968.

The incorporation of ^{14}C-labeled amino acids (lysine and phenylalanine) into whole tissue proteins was studied in pancreas slices obtained from 6-8 week-old fed or fasted, White Carneau pigeons given saline or methacholine (1.25 mg i.m.) 0-120 min before sacrifice. Compared with controls, incorporation of ^{14}C-L-phenylalanine was increased within 5 min after i.m. administration of methacholine, reaching a maximum at 30 min and returning to control levels by 120 min after methacholine. Amylase isolated from pancreas slices obtained from pigeons 30 min after administration of methacholine had a higher specific activity than amylase from saline-treated controls. Rates of amylase and protein synthesis by pancreas slices from treated pigeons were also greater after methacholine than after saline, and were higher in fed than in fasted animals. Pancreas tissue from methacholine-treated pigeons not only incorporated greater amounts of ^{14}C-L-leucine into proteins, either per mg of protein or per mg of DNA, but also incorporated ^{14}C-L-phenylalanine or ^{14}C-L-leucine into protein at higher rates than pancreas slices from saline-treated controls. Methacholine had no effect on protein synthesis when added *in vitro*, and there was no difference between the saline- and methacholine-treated groups in rates of accumulation of either phenylalanine or leucine. These results indicate that methacholine, and perhaps all cholinergics, induces pancreatic protein synthesis.

3712 A COMPARISON BETWEEN THE EFFECTS OF HYPOPHYSECTOMY AND ADRENALECTOMY ON THE GASTRIC MUCOSA OF THE RAT. *(E.)*

Crean, G. P. (Med. Res. Counc. Clin. Endocrin. Res. Unit, U. Edinburgh, Scotland). *Gut* 9(3):343-347, 1968.

A homogenous population of 32 young male rats was used to study the effects of hypophysectomy and total adrenalectomy on the weight of the whole stomach, surface area and volume of the fundic mucosa, and total parietal cell population. It was found that while total adrenalectomy exerted no significant effects on the gastric mucosa, hypophysectomy markedly reduced the values obtained for all these parameters. It is concluded that this effect is not due simply to the inhibition of somatic growth which follows pituitary deprivation in this species, but must be due to a specific effect of pituitary deprivation on the stomach. Future studies are urged, aimed at examining the effects of individual hormones in restoring the growth of the gastric mucosa after hypophysectomy.

3713 EFFECT OF HYPOPHYSECTOMY ON THE GASTRIC MUCOSA OF THE RAT. *(E.)*

Crean, G. P. (Med. Res. Counc. Clin. Endocrin. Res. Unit, U. Edinburgh, Scotland). *Gut* 9(3):332-342, 1968.

The effects of hypophysectomy on the growth of the gastric mucosa were studied in a total of 3 experiments on 169 rats. In all 3 experiments, hypophysectomy caused a reduction in the weight of the stomach, the surface area and mucosal volume of the fundus, and the total parietal cell population. From these results it is concluded that hypophysectomy either retarded or caused a regression in the growth of the gastric mucosa as a whole. It was also shown that these results were not due simply to the inhibition of somatic growth which follows hypophysectomy in the rat, but that they must represent a specific effect of pituitary deprivation on the stomach. It is concluded that the pituitary is in some way responsible for maintaining the growth of the gastric mucosa, not only in young growing animals but also in fully matured adult rats.

3714 FACTORS INFLUENCING THE ASSESSMENT OF SIZE OF THE MUCOSAL SURFACE AND LENGTH OF THE SMALL INTESTINE IN RATS. *(E.)*

Hromadkova, V. (Inst. Human Nutrit., Prague, Czechoslovakia) and I. Skala. *Digestion* 1(3):149-158, 1968.

A reproducible, standardized technique was developed for measuring the length, circumference, and mucosal surface area of the rat small intestine. The length of the intestine (from the pylorus to the ileocecal junction), measured after being suspended by the proximal end for 10 min with a 7-g weight attached to the distal end, in fasting, male, Wistar rats weighing 170-210 g was found to be 96.9 ± 5.6 cm without fixation, 87.6 ± 5.6 cm when the intestines were fixed with Bouin's solution for 20 min *in situ* before excision, and 91.9 ± 6.6 cm when the intestines were first excised and then fixed with Bouin's solution extracorporeally; the circumference of the intestine in these 3 groups (outlined with an Abbe drawing apparatus and measured with a map measurer after embedding the specimen in gelatin) was 1.06 ± 0.05 cm, 1.38 ± 0.11 cm, and 1.27 ± 0.06 cm, resp. This yields a correction factor of 1.106 (*in situ*) and 1.054 (extracorporeal) for the effect of prefixation on length, and one of 0.768 (*in situ*) and 0.835 (extracorporeal) for the effect of prefixation on circumference. After complete histological processing (immersion in Bouin's solution for 48 hr and embedding in paraffin), these correction factors become 1.66 and 1.166, resp., for the length and 1.177 and 1.355, resp., for the circumference. Data obtained for the length and circumference were then used to calculate the serosal area (102.7 cm^2 without fixation, 120.9 cm^2 after fixation *in situ*, 116.7 cm^2 after extracorporeal fixation) and the ratio between the mucosal and serosal surface areas in completely fixed and embedded preparations: 5.29 in the proximal small intestine (10 cm distal to the duodenojejunal flexure), 4.09 in the central small intestine (the midpoint of the jejunoileum), and 3.39 in the distal small intestine (10 cm proximal to the ileocecal junction). The mucosal surface area at these 3 points (in cm^2/cm) was therefore 7.16, 6.31 and 4.84, resp., yielding a value of 436.5 cm^2 for the mucosal surface area of the entire small intestine in the rat. There was a significant correlation ($r = 0.594$) between the mucosal/serosal surface-area ratio and the villous height (322 ± 46μ in the proximal, 264 ± 42μ in the central, and 225 ± 42μ in the distal small intestine), but not between the villous height and the mucosal surface area.

3715 HISTIDINE DECARBOXYLASE AND DOPA DECARBOXYLASE IN THE RAT STOMACH. PROPERTIES AND CELLULAR LOCALIZATION. *(E.)*

Aures, D. (VA Hosp., Sepulveda, Calif.), R. Hakanson and A. Schauer. *Europ J Pharmacol* 3(3):217-234, 1968.

3716 **LIGHT AND DARK CELLS AS ARTIFACTS OF LIVER FIXATION.** *(E.)* Ganote, C. E. (NIAMD, Natl. Inst. Health, Bethesda, Md.) and H. L. Moses. *Lab Invest* 18(6):740-745, 1968.

3717 **EXPERIMENTAL STUDIES ON THE CELLS OF THE ORGAN OF ERSPAMER IN THE DUODENUM.** *(Pol.)* Staszye, J. (Inst. Histol. Embryol., Acad. Med., Lublin, Poland). *Patol Pol* 19(1):189-196, 1968.

3718 **RAT INTESTINAL MICROVILLUS MEMBRANES: PURIFICATION AND BIOCHEMICAL CHARACTERIZATION.** *(E.)* Forstner, G. G. (Harvard Med. Sch., Boston, Mass.), S. M. Sabesin and K. J. Isselbacher. *Biochem J* 106(2):381-390, 1968.

3719 **THE EFFECT OF EXTRACTUM FILICIS ON THE FINE STRUCTURE OF THE HUMAN LIVER CELLS.** *(E.)* Takki, S. (U. Helsinki, Finland), E. J. Valtonen and S. Tarpila. *Ann Med Intern Fenn* 57(2):81-84, 1968.

ABSORPTION

720 ABSORPTION OF LACTIC ACID FROM AN ISOLATED INTESTINAL SEGMENT IN THE NTACT RAT.

(E.) Heller, H. D. (U. Colorado Med. Ctr., enver) and F. Kern Jr. *Proc Soc Exp Biol Med* 127(4):1103-106, 1968.

actic acid absorption was studied in anesthetized rats by erfusing isolated segments of small intestine or colon for hr with sodium lactate-1-^{14}C (4.5 mC/mmole adjusted to he desired pH with HCl and to approximately 290 milliosmoles with NaCl). The aspirate was collected by gravity in 15-min aliquots, of which 0.5 ml was added to 10 ml of Bray's olution. The radioactivity was assayed in a liquid scintillation pectrometer. The amount of lactic acid absorbed was calculated by subtracting the radioactivity collected from that administered. Radioactivity of expired air was also measured. Lactate absorption was maximal at pH 2.8 (near the pK of lactate), decreased linearly as pH increased to 4.8, and remained constant from pH 4.8 to 6.8. Absorption was maximal in the proximal jejunum, less in the ileum, and least in the colon. Absorption was directly related to concentration of lactic acid perfused, as shown by the collection of expired $^{14}CO_2$ from 2 rats during perfusion; this accounted for 32% and 42% of the labeled lactate that had disappeared from the lumen. Absorption was not affected by 2,4-dinitrophenol, a metabolic inhibitor injected subcutaneously into 2 other rats 15 min prior to perfusion. It is suggested that poor lactate absorption at physiologic pH, and in the distal intestine, might lead to an osmotic diarrhea in certain patients with malabsorption.

3721 INCREASED EXCRETION OF FECAL BILE ACIDS BY AN ORAL HYDROPHILIC COLLOID.

(E.) Forman, D. T. (Evanston Hosp., Ill.), J. E. Garvin, J. E. Forestner and C. B. Taylor. *Proc Soc Exp Biol Med* 127(4): 1060-1063, 1968.

Weekly fecal specimens collected from 2 normal, young, adult males on a self-selected mixed diet, each meal containing 0.5 g Cr_2O_3 as an indicator, were analyzed for bile acid excretion (Forman method) and neutral sterols (Abell method). Serum cholesterol was also monitored. After a 4-week pre-experimental period during which control values were established, the subjects were fed 9.6 g/day of Metamucil (an oral hydrophilic colloid) for 6 weeks. It was found that, during the feeding with the mucilloid, mean serum cholesterol (control value, 206 mg/100 ml) decreased an average of 17% (36 mg/100 ml). The mean fecal bile acid excretion increased by an average of 677 mg daily above the control value of 347 mg/day. Neutral sterols were not affected. It is argued that bile acid excretion increases the synthesis of bile acids from cholesterol, thus depleting the body pool of cholesterol. This may be compensated by an increase in cholesterol synthesis resulting in the stabilization of serum cholesterol at lower levels. It appears that the mucilloid increases the excretion of bile acids by somehow restricting the resorption of bile salts in the ileum. It is possible that the mucilloid lowers serum cholesterol levels differently (several mechanisms are given) from other means already known. Its therapeutic application would involve no manipulation of diet.

3722 ACTIVE Na^+ TRANSPORT BY PIGEON CROP MUCOSA.

(E.) Frantz, W. L. (Michigan State U., E. Lansing) and R. C. Rose. *Amer J Physiol* 215(3): 569-573, 1968.

White King pigeon crop mucosa was fitted between the halves of a Lucite chamber with 3.5 ml oxygenated Ringer glucose solution in each half; 100 μl solution of 0.02 N $^{22}NaCl$ (0.182 μC) or 0.44 N $H^{36}Cl$ (0.182 μC) was then pipetted into 1 chamber (counts being taken at 0.5 and 10 min). Transmembrane potentials were recorded with a calomel electrode filled with saturated NaCl. The isolated pigeon crop serosa became electropositive with respect to the mucosa by 17.4 ± 16.5 mv. Short-circuit current expressed as e^- flux correlated with the net Na^+ flux (^{22}Na dilution). There was no electrochemical gradient along the short-circuited membrane, but Na^+ accumulated in the serosa-facing solution at a net flux of 0.46 $\mu Eq/cm^2$ per hr. It was shown that the transporting mechanism in the epithelium involves a substrate dependence which can be met by glucose. The slowness of glucose depletion was due to the reserve of intermediate substrates available within the membrane. A respiratory chain blocking agent (2,4-DNP) inhibited Na^+ transport, showing that the process depends on aerobic energy. Ouabain (a K^+-dependent pump ATPase inhibitor) and temperatures above 41C also inhibited the transport mechanism.

3723 EFFECT OF HYDROCHLORIC ACID ON IRON ABSORPTION.

(E.) Schade, S. (Walter Reed Army Inst. Res., Washington, D. C.), R. Cohen and M. Conrad. *New Eng J Med* 279(13):672-674, 1968.

The role of stomach acid in iron absorption was studied by the administering of tagged soluble and insoluble ferric iron to 6 normal subjects and 6 with pernicious anemia. Ferric iron was mixed with ascorbate to form a chelate soluble after alkalinization with sodium hydroxide; precipitation with sodium hydroxide before adding the ascorbate yielded an insoluble form. Measurement of absorption with a whole-body counter revealed that normal subjects absorbed almost as much iron from the precipitated preparation as from the solubilized one. However, achlorhydric patients with pernicious anemia absorbed a significantly greater amount of iron from the soluble chelate than from the precipitate. It is suggested that the poor absorption of ferric iron from food in achlorhydric and gastrectomized subjects may be due to the absence of gastric acid, which normally facilitates gastric chelation of ferric salts with ascorbate and other exogenous and endogenous substances.

3724 ENHANCEMENT OF INTESTINAL IRON ABSORPTION BY A HUMORAL EFFECT OF HYPOXIA IN PARABIOTIC RATS.

(E.) Brittin, G. (U. California Med. Ctr., San Francisco) and G. Brecher. *Proc Soc Exp Biol Med* 128(1):178-184, 1968.

Parabiotic rats were studied to ascertain whether the increased iron absorption associated with hypoxia is subject to humoral control. It was found that iron absorption in rats whose partners were exposed to hypoxia was greater than that in rats whose partners were normally oxygenated. In rats subjected to bilateral nephrectomy, iron absorption was less than in controls, but was increased by hypoxia. Increased erythropoiesis was not associated with the increased iron absorption induced by hypoxia. It was concluded that intestinal iron absorption may be mediated by some transferable humoral factor other than erythropoietin.

3725 THE EFFECT OF SOME ANTIBIOTICS ON TRIGLYCERIDE SYNTHESIS IN THE SMALL INTESTINAL MUCOSA. *(Ger.)* Becker, K. (1st Med. Clin., U. Hamburg, Germany). *Z Gastroent* 6(3):181-184, 1968.

Prolonged antibiotic therapy can result in steatorrhea due to interference with lipid absorption. Since one step in the mechanism of long-chain fatty acid absorption is triglyceride synthesis within the intestinal mucosa, the effect of antibiotics on this process was studied *in vitro* using fragments of rat duodenal mucosa suspended in phosphate buffer (pH 7.42) containing glucose, electrolytes, serum albumin and 0.2 μC ^{14}C-palmitic acid and incubated in O_2 at 37C. At an antibiotic concentration of 0.1%, triglyceride synthesis was significantly inhibited by paromomycin, tetracycline and chloramphenicol, and somewhat inhibited by neomycin. The catabolism of palmitic acid to CO_2, on the other hand, was significantly inhibited only by tetracycline.

3726 DETERMINING THE SITE OF ABSORPTION OF IRON IN THE INTESTINAL TRACT BY MEANS OF A REMOTE-CONTROLLED INTESTINAL CAPSULE. *(Ger.)* Hemmati, A. (Med. Polyclin., U. Bonn, Germany). *Deutsch Med Wschr* 93(31):1468-1472, 1968.

A remote-controlled capsule containing approximately 5 mg of Fe in the form of ferrous citrate with a radioactivity of 5 μC, which could be opened by a high-frequency impulse (1.5 megacycles/sec.) after reaching the desired position in the ileum, was used to study iron absorption in 40 healthy volunteers (28 men and 12 women, 28-57 yr old). Blood samples were taken 1-24 hr after administration of either the capsule or an equivalent dose of iron p.o. While a maximum of 1.17-3.16% (average 2.34%) or 1.45-2.75% (average 2.66%) of the administered dose was found in the bloodstream 3 and 5 hr, resp., after oral administration, only 0.016-0.17 (average 0.12%) and 0.06-0.16 (average 0.09%) of the dose was found in the bloodstream 3 and 5 hr, resp., after intraileal administration. It is concluded from these results that the major site of iron absorption is the duodenum and upper jejunum, very little iron being absorbed by the ileum or large intestine.

3727 STRUCTURAL REQUIREMENTS FOR ACTIVE INTESTINAL SUGAR TRANSPORT: THE INVOLVEMENT OF HYDROGEN BONDS AT C-1 AND C-6 OF THE SUGAR. *(E.)* Barnett, J. E. G. (Dept. Physiol. Biochem., U. Southampton, England), W. T. S. Jarvis and K. A. Munday. *Biochem J* 109(1):61-67, 1968.

A series of d-galactose derivatives substituted at C-1 and C-6 was tested for active accumulation by everted segments of hamster and rat intestine. Determination of tissue/medium ratios of modified galactose derivatives showed that oxygen removal from the optimum configuration produces a fall in or an absence of active transport and that the oxygen is probably involved in bonding with the carrier. The considerable decrease in the rate of transport of 6-deoxy- and 6-chloro-6-deoxy-d-galactose suggested that the hydroxyl group at C-6 is involved in the transport process. The size of the substituent at C-6 that allows transport lies between that of chlorine and that of bromine. d-Glucose probably binds to the carrier by hydrogen-bonding at C-1, C-2, C-3, C-4 and C-6, and if one of those bonds is missing, the sugar is still actively accumulated. C-2 is more important and alteration of the hydroxyl group appears to cause loss of transport. Loss of two or more of the bonds usually causes complete loss of active transport. It was noted from a previous study that a possible cause of active transport of sugars is the Na^+ gradient across the membrane, which produces a high affinity of sugar for the carrier (Na^+-carrier-sugar complex) on the outer surface of the membrane but low affinity on the inside. Kinetic analysis of the initial rate of sugar transport and determination of K_i (measured by the inhibition of methyl α-d-glucopyranoside transport) showed that saturation of the carrier is not the only variable and that some subsequent process can alter the rate of sugar transport.

3728 NEOMYCIN EFFECTS ON GLUCOSE TRANSPORT BY RAT SMALL INTESTINE. *(E.)* Rogers, A. I. (U. Miami Sch. Med., Fla.), P. S. Bachorik and A. S. Nunn. *Digestion* 1(3):159-164, 1968.

The effect of neomycin on intestinal glucose absorption was studied in everted sacs (3-6 cm in length) prepared from the proximal, middle and distal thirds of the small intestine of adult male rats (Charles River CD strain) that had been maintained on a diet of 68% sucrose, 10% vegetable oils, 10% non-nutritive cellulose, 8% nitrogen, and 4% salts and vitamin supplements. When the sacs were incubated in Krebs-Ringer solution containing 300 mg% glucose for 60 min at 37C, during which time the mucosal solution was gassed with 5% CO_2 in O_2, both absorption and active transport of glucose were significantly enhanced by neomycin, whether the antibiotic was added to the food (35-60 mg/day for 21 days) before sacrifice of the rats or added to the mucosal solution *in vitro* (100 mg%). Feeding of neomycin had no effect on the total fecal fatty acids or intestinal histology. Both absorption and transport were markedly lower in the distal third, and the enhancing effect of *in vitro* neomycin was not statistically significant in sacs from this segment. In other experiments, the enhancing effect of *in vitro* neomycin on glucose absorption (5 mg% in Krebs-Ringer solution on the mucosal side only) was found to be independent of variations in mucosal sodium concentration (0-100 mEq/liter), although absorption itself was increased from 0.4 to 1.4 μmoles/sac/30 min by addition of 100 mEq/liter of sodium. Addition of neomycin (100 mg%) *in vitro* had no effect on lactate production in sacs of proximal intestine incubated in Krebs-Ringer solution with 300 mg% glucose. The mechanism of the enhancing effect of neomycin on glucose absorption in rat small intestine therefore remains unknown.

3729 PERSORPTION OF PARTICLES. *(E.)* Volkheimer, G. (First Med. U. Clin., Charite Hosp., Berlin, Germany), F. H. Schulz, I. Aurich, S. Strauch, K. Beuthin and H. Wendlandt. *Digestion* 1(2):78-80, 1968.

The mechanism and pathway of the persorption of large corpuscular food particles were studied in 134 young white rats given a diet of potato starch in cream. Potato-starch granules were occasionally found between the epithelial cells of the intestinal mucosa, in the subepithelial region of the mucosa, and in the lumen of lymph and blood vessels of the intestinal wall. The persorption pathway is reconstructed on the basis of the position of these potato-starch particles.

3730 EFFECT OF INTRAVENOUS ANTIDIURETIC HORMONE ADMINISTRATION ON SALT AND WATER ABSORPTION FROM THE HUMAN COLON. *(E.)*

evitan, R. (Tufts U. Med. Sch., Boston, Mass.) and I. Mauer. *Lab Clin Med* 72(5):739-746, 1968.

he effect of i.v. antidiuretic hormone (ADH, 1 U/hr for 1 hr) n colonic salt and water absorption was studied in 9 healthy, vell-hydrated men (20-25 yr old). The average transit time f the test solution (0.85% NaCl plus 0.5% polyethylene glycol) vas also measured in 4 healthy subjects and one cirrhotic patient vith a colonic bypass. The colon was intubated per os and per- used with the test solution for 1 hr before, during and after ADH administration. During and for 1 hr following ADH per- usion, water, sodium and chloride absorption decreased sig- ificantly. The mean transit time also decreased in all studies. igmoidoscopies performed on 3 subjects showed no gross hanges in the color of the mucosa or the size of the blood essels. These findings are contrary to those of previous studies lone on rat and mouse large intestine. Possible explanations or the current findings include: 1) a marked decrease in col- nic blood flow, 2) alteration in permeability of the mucosa,) inhibition of the sodium pump, 4) increased colonic cellular ecretion, 5) emptying of large volumes of small bowel contents nto the large intestine during ADH administration, and 6) a hange in transit time of the test solution from the cecum to he rectum.

3731 **COMPARISON OF THE TRANSPORT CHARACTERISTICS OF L-LYSINE BY RAT INTESTINE AND KIDNEY CORTEX.** *(E.)* Segal, S. (Children's Hosp., Philadelphia, Pa.), L. M. Lowenstein and A. Wallace. *Gastroenterology* 55(3):386-391, 1968.

Kidney slices and everted jejunal mucosal rings from 140-160 g Sprague-Dawley rats were incubated with ^{14}C-labelled L-lysine in Krebs-Ringer bicarbonate buffer under the following conditions: differing L-lysine concentrations (0.065, 0.55, and 30 mM), sodium deprivation, varying pH (5-8.5), and anaerobiosis. The study was designed to investigate the mechanisms of dibasic amino acid transport in the tissues. The accumulation of L-lysine is defined by the distribution ratio, the ratio of ^{14}C-L-lysine cpm/ml of intracellular fluid to cpm/ml of medium, with a ratio greater than 1 indicating active transport. At a substrate concentration of 30 mM, intestinal tissue does not establish a concentration gradient for lysine, while kidney cortex maintains a gradient of approximately 2; thus, kidney tubular cells possess an active transport mechanism for lysine at high substrate concentrations. L-Cystine inhibits L-lysine uptake into the intestinal mucosa, but not in the kidney cortex. There was a decrease in the steady state distribution ratio of kidney cortex from 3 to 2 after 15 min incubation in sodium deficient medium and under anaerobiosis (95% N_2 - 5% CO_2); gut segments showed a marked decrease in uptake from the beginning under similar conditions. Jejunum was incapable of establishing a concentration gradient under anaerobiosis. Kidney cortex uptake showed little dependence on pH, while intestinal transport was optimum at pH 7.0. The data indicate that there are multiple mediated transport systems in kidney cortex capable of forming concentration gradients at high substrate concentrations, partially dependent on sodium ion and oxygen tension, with little or no dependence on pH, no interaction between L-lysine and L-cystine, and with clear cut evidence of exchange diffusion. The intestine has a single transport system incapable of establishing concentration gradients at high initial substrate concentrations, markedly dependent on sodium, oxygen tension and pH, inhibited by cystine, and shows no evidence of exchange diffusion. Thus, it would seem that the lysine transport mechanisms of kidney cortex and intestinal epithelium are more different than alike.

3732 **RESPONSE OF THE NORMAL AND PATHOLOGICAL HUMAN GASTRIC MUCOSA TO AN INSTILLED ACID LOAD.** *(E.)* Chapman, M. A. (Mt. Sinai Hosp., New York City), J. L. Werther and H. D. Janowitz. *Gastroenterology* 55(3):344-353, 1968.

In a comparative study of normal and abnormal gastric mucosa barrier function, a decline in H^+ and Cl^- concentrations and osmolality and a concomitant rise in Na^+ and K^+ concentrations occurred in isotonic HCl (160 mEq/l) instilled into the stomachs of 7 normal subjects, 7 gastric ulcer patients, and 4 pernicious anemia patients. Phenol red was used to monitor transpyloric losses and residual volumes. H^+ was insorbed and Na^+ was gained in all subjects in all test periods. The Na^+ rise and H^+ fall were significantly greater in 2 of 7 ulcer patients and 3 of 4 pernicious anemia patients than in control subjects. All gastric ulcer patients insorbed more acid during the experiment than they secreted in the basal state, and 3 insorbed more than was secreted in response to histamine stimulation. K^+ entered the stomach lumen in all experiments; there were no significant differences between the groups. Cl^-, absorbed in all subjects, showed greater loss in 2 pernicious anemia patients than in control subjects. There was a net gain in volume in all subjects. In protein and hexosamine studies, protein concentrations were greater in 5 gastric ulcer patients and 2 pernicious anemia patients than in controls, with output being significantly elevated in 4 ulcer patients. The only significant rise in hexosamine concentration and output occurred in 2 ulcer patients and 1 anemia patient. In general, the qualitative behavior of pathological and normal stomachs was the same, and uniformity of response in each subject was the rule. Patients with large gastric ulcers and hyposecretion and pernicious anemia patients showed a greater fall in H^+ concentration and a more pronounced rise in Na^+: these changes resulted from increased nonparietal secretion and greater H^+ insorption.

3733 **ABSORPTION OF IRON INSTILLED INTO THE STOMACH, DUODENUM, AND JEJUNUM.** *(E.)* Rhodes, J. (Royal Infirm., Cardiff, Wales), D. Beton and D. A. Brown. *Gut* 9(3):323-324, 1968.

Six healthy volunteers were used to study iron absorption from two doses of radioactive ferric ammonium citrate, placed simultaneously at different sites in the gastrointestinal tract. It was found that absorption from the stomach and upper jejunum were similar while absorption from the second part of the duodenum was relatively poor. It was suggested that the greater absorption of gastric iron may be due to the lower pH in the stomach since the iron instilled directly into the duodenum was exposed to pancreatic and biliary secretions which have a pH of about 8. It is also possible that the pancreatic juice has some direct inhibitory effect on iron absorption.

3734 **STUDIES ON INHIBITION OF INTESTINAL ABSORPTION OF RADIOACTIVE STRONTIUM. VII. RELATIONSHIP OF BIOLOGICAL ACTIVITY TO CHEMICAL COMPOSITION OF ALGINATES OBTAINED FROM NORTH AMERICAN SEAWEEDS.** *(E.)* Tanaka, Y.

(McGill U., Montreal, P. Q. Canada), D. Waldron-Edward and S. C. Skoryna. *Canad Med Ass J* 99(4):169-175, 1968.

The biological activity of various marine algae was evaluated because of their practical significance as a means of preventing intestinal absorption of radioactive strontium as well as their possible use as natural decontaminators. In this study, which was done on a number of species of brown seaweed collected on the Atlantic and Pacific coasts of Canada and the United States, the crude yield, moisture, alginic acid content and mannuronic-guluronic acid ratio were estimated. The level of inhibition of strontium absorption was measured in the rat by an intubation method. It was found that alginates with a high guluronic acid content were more effective in inhibiting strontium absorption. There was little interference with calcium absorption or bone uptake by any of the samples of alginate. It was suggested that the ability of alginate to discriminate between strontium and calcium *in vivo* may be related to the stereochemical configuration of the respective carboxyl groups and other steric factors.

3735 **INTESTINAL ABSORPTION AND TURNOVER OF dl-METHIONINE DURING REPRODUCTION IN THE RAT.** *(E.)* Penzes, L. (Budapest Med. U., Hungary) and G. Simon. *Jap J Physiol* 18(3):288-296, 1968.

3736 **ABSORPTION OF IONIC AND COMPLEX-BOUND COPPER IN THE STOMACH AND SMALL INTESTINE.** *(Rus.)* Merkulova, I. S. (Gor'kiy Don Med. Inst., USSR), V. P. Soroka and N. Z. Rudenko. *Biull Eksp Biol Med* (8):56-60, 1968.

3737 **THE RELATION OF THE INTESTINAL CELL SURFACE TO VITAMIN B_{12} ABSORPTION.** *(E.)* Donaldson, R. M. Jr. (Boston U. Sch. Med., Mass.). *Med Coll Virginia Quar* 4(1):18-20, 1968.

3738 **GASTROINTESTINAL ABSORPTION OF DRUGS.** *(E.)* Lemanowicz, E. F. (Philadelphia Coll. Pharm. & Sci., Pa.). *Amer J Pharm* 140(4):124-128, 1968.

3739 **NEW DATA ON THE INFLUENCE OF THE EXOCRINE PANCREAS ON IRON ABSORPTION.** *(Ger.)* Dietze, F. (1st Med. Clin., Charité Hosp., U. Berlin, Germany) and G. Bruschke. *Z Ges Inn Med* 23(12): 185-187, 1968.

3740 **FACTORS INFLUENCING THE ELECTRICAL POTENTIAL ACROSS THE MUCOSA OF RAT COLON.** *(E.)* Edmonds, C. J. (U. Coll. Hosp. Med. Sch., London, England) and J. Marriott. *J Physiol (London)* 194(2): 457-478, 1968.

3741 **GENETIC INFLUENCE ON ALIMENTARY LIPAEMIA IN RATS.** *(E.)* Friedman, M. (Mt. Zion Hosp. Med. Ctr., San Francisco, Calif.) and S. O. Byers. *Nature* 217(5125):235-237, 1968.

3742 **IRON BINDING PROPERTIES OF SALIVA.** *(E.)* Reilly, P. L. (Dept. Med., U. Adelaide, Australia), P. S. Davis and D. J. Deller. *Nature* 217(5123): 68, 1968.

3743 **ABSORPTION OF BILE PIGMENTS BY THE GALLBLADDER.** *(E.)* Ostrow, J. D. (Western Reserve U. Sch. Med., Cleveland, Ohio). *J Clin Invest* 46(12): 2035-2052, 1967.

3744 **THE MONOGLYCERIDE PATHWAY OF FAT ABSORPTION IN MAN.** *(E.)* Kayden, H. J. (New York U. Sch. Med., N. Y.), J. R. Senior and F. H. Mattson. *J Clin Invest* 46(11):1695-1703, 1967.

3745 **SOME EFFECTS OF OUABAIN AND POTASSIUM ON TRANSPORT AND METABOLISM IN RAT SMALL INTESTINE.** *(E.)* Newey, H. (Dept. Physiol., U. Sheffield, England), P. A. Sanford and D. H. Smyth. *J Physiol (London)* 194(1):237-248, 1968.

See also abstract nos.: 3886,4436

3746 **EFFECT OF CALCIUM INFUSION ON GASTRIC FUNCTION IN RATS.** *(E.)* Kowaleski, K. (U. Alberta, Surg. Med. Res. Inst., Edmonton, Canada). *Proc Soc Exp Biol Med* 127(4):1134-1137, 1968.

Studies were made of the effect of prolonged calcium infusion on gastric function in adult Sprague-Dawley rats bearing permanent gastric fistulas with a Pavlov cannula inserted. After initial drainage for 30 min, normal saline (control) or calcium gluconate (300 mg/100 ml in saline) were infused into a femoral vein at the rate of 100 ml/kg daily. Gastric content and urine and blood samples were collected during the 24 hr period. After infusion, the stomachs were removed, homogenized individually in 100 ml of 0.1 N HCl for 10 min, filtered, and aliquots taken for histological study. All calcium-infused rats showed hypercalcemia, diuresis with increased urinary calcium, increased hematocrit, reduced free and total HCl concentration and content in the gastric juice, elevated blood pepsinogen, and reduced gastric tissue pepsinogen. Tissue study showed a decrease of paranuclear zymogen granules in the chief cells. It was suggested that in the calcium-infused rats, the parietal cells were inadequately stimulated or inhibited in the presence of hypercalcemia. This study differs from other studies in the method used for inducing hypercalcemia. The results do not exclude the possibility that parathormone or vitamin D do not directly affect the gastric mucosa.

3747 **THE EFFECT OF FUROSEMID ON GASTRIC SECRETION.** *(Ger.)* Mertz, D. P. (Med. Polyclin., U. Freiburg i. Br., Germany) and W. Poppe. *Klin Wschr* 46(15):820-823, 1968.

In 10 fasting, healthy adults (8 men and 2 women, 23-47 yr old) undergoing maximal stimulation with Histalog (2 mg/kg/hr i.v.) and chlorphenoxamine (10 mg i.m.), administration of furosemid (20-40 mg i.v.) had no significant effect on either the volume or the concentration of the gastric juice, nor on the relative secretion of hydrogen, sodium, potassium, calcium, magnesium and chloride ions. The average hourly secretion was 34.22 mEq H$^+$, 43.72 mEq Cl$^-$, 5.854 mEq Na$^+$, and 2.700 mEq K$^+$ in a volume of 308.8 ml of essentially isotonic gastric juice (relative osmolality compared to plasma of 0.94). These results indicate that furosemid does not affect the sodium transport system in the gastric mucosa.

3748 **THE PENTAGASTRIN TEST AS A ROUTINE CLINICAL TEST FOR THE EVALUATION OF GASTRIC ACID SECRETION.** *(Ger.)* Halter, F. (Med. Clin., U. Bern, Switzerland) and H. U. Funk. *Schweiz Med Wschr* 98(31):1149-1151, 1968.

Gastric acid secretion in response to histamine (40 μg/kg s.c. plus an antihistamine) and pentagastrin (6 μg/kg s.c.) were compared in 48 fasting patients, including 16 with peptic ulcers, 15 with functional disorders, 7 undergoing Billroth II gastrectomy, 5 with diseases of the small intestine, and 5 with miscellaneous diseases. The acid output produced by the two stimulants showed a high degree of correlation (0.933) during the first hour, with a peak during the 2nd 20-min period in both cases. The hourly output averaged 22.8 mEq HCl for histamine and 21.3 mEq HCl for pentagastrin, and ranged from almost 0 to 50 mEq HCl /hr. The pentagastrin curve, however, levelled off more rapidly, resulting in a significant difference during the 3rd 20-min period. In 3 patients in whom both tests were carried out both before and after two-thirds gastrectomy, the histamine test showed a decrease from 20.1, 21.0 and 28.3 to 1.5, 1.1 and 11.6 mEq/hr, resp., while the pentagastrin test showed decreases from 23.4, 21.2 and 30.1 to 1.5, 0.8 and 8.0 mEq/hr. There were no side effects due to pentagastrin in this group of patients, although among 50 other patients given the test, 2 complained of mild transitory nausea. It is concluded that pentagastrin has definite advantages over histamine and histalog for routine studies.

3749 **TELEMETRIC METHOD FOR THE DETERMINATION OF GASTRIC ACIDITY USING A RADIO CAPSULE.** *(Pol.)* Plocker, L. (SDL Gastroent. Clin., Acad. Med., Warsaw, Poland) and K. Chrostowski. *Pol Tyg Lek* 23(33):1229-1231, 1968.

The equipment needed for the telemetric measurement of gastric pH using the Heidelberg capsule is described in detail, along with the principles of the method. Types of gastric acidity curves obtained from normal subjects and patients with secretory disorders after the ingestion of NaHCO$_3$ are illustrated, and some of the advantages and disadvantages of the method are pointed out. These conclusions are based on the findings in 26 patients, including 6 with duodenal ulcers, 11 with gastric ulcers, 3 with stomach cancer, 2 with previous gastrectomies, and 4 with other diseases of the digestive tract (detailed results are not presented). Hyperacidity is characterized by a reduction in the time required for the gastric pH to return to 2.0 (6.5 min in a case of peptic ulcer, for example, compared to 18 min in controls), while in hypoacidity the time can be increased to 30 min or longer; the response to histamine can also be followed in this way.

3750 **COMPARATIVE STUDIES ON INTRAMUSCULAR AND ORAL EFFECTIVE DOSES OF SOME ANTICHOLINERGIC DRUGS.** *(E.)* Moller, J. (Dept. Med., Karolinska Inst. Stockholm, Sweden) and A. Rosen. *Acta Med Scand* 184(3):201-209, 1968.

The effects of i.m. and p.o. doses of propantheline and methyl- and butyl-scopolamine on salivary secretion, heart rate, and visual accomodation were studied in 16 healthy volunteers. The responses to the 2 different administrations of each drug were compared quantitatively in the same subjects. Propantheline and methylscopolamine had a greater effect on salivary secretion than on the heart rate or visual accomodation. The ratio of i.m. and p.o. doses producing comparable total effects on salivation was 1:10 for propantheline and 1:100 for methylscopolamine. Oral butylscopolamine in doses up to 480 mg produced no anticholinergic effects. In contrast to the other compounds, i.m. butylscopolamine produced only transient effects and influenced mainly accomodation. Less than 10% of administered methylscopolamine and only very little butylscopolamine is absorbed from the gastrointestinal tract.

3751 **POTENTIOMETRIC DETERMINATION OF GASTRIC JUICE BUFFER SUBSTANCES AND GLYCOPYRROLATE EFFECT.** *(E.)* Kristensen, M. (Dept.

Pharmacol., U. Copenhagen, Denmark). *Acta Med Scand* 183(1/2):113-116, 1968.

A method for determining the concentration of buffer substances in the gastric juice on the basis of automatic potentiometric titration is described which includes a correction for the sodium, potassium and water content of the gastric juice; the applicability of this method for investigating the influence of glycopyrrolate is demonstrated. Gastric juice (750 µl for each titration) was collected from 2 patients with peptic ulcer before and 2 hr after intramuscular injection of 0.25 ml glycopyrrolate (1 mg/ml). The buffer substances were completely saturated by adding 100 µl of 1 N HCl to the samples prior to titration with 2 N NaOH. Subtraction of the blank titration curve (750 µl NaCl plus 100 µl 1 N HCl) from the gastric juice titration curve gave a difference curve which represented the titration of the gastric juice buffer substances. The pH of gastric samples collected from a 40-yr-old woman with gastric ulcer before and after glycopyrrolate administration was 2.75 and 7.05, resp. The pH for a 40-yr-old man with duodenal ulcer was 1.55 before and 4.05 after glycopyrrolate administration. Glycopyrrolate increased the number of hydrogen ions that could be bound in the same volume of gastric juice in the 2 patients (350% in the patient with gastric ulcer and 50% in the patient with duodenal ulcer). All the calculated titration curves for the buffer substances of the gastric juice showed identical buffer areas with maxima around pH 3.5, 7.5 and 9.5, and the titration appeared to be complete at pH 10.5-11.0.

3752 THE EFFECT OF SYNTHETIC SECRETIN ON EXTERNAL PANCREATIC SECRETION. *(E.)*

Henriksen, F. W. (Inst. Exp. Res. Surg., Copenhagen, Denmark). *Acta Physiol Scand* 72(4):433-440, 1968.

The effect of synthetic secretin on external pancreatic secretion was investigated in 3 dogs with Thomas fistulas and gastrostomies. After collecting fasting pancreatic secretions for 2 or more 15-min periods, secretin-induced secretions were collected until the effects of the hormone had subsided. Secretin (10 U/ml of isotonic saline) was given either as single i.v. injections (for 10-15 sec) or as continuous i.v. infusions (160 min). The different doses (0.25 to 12.0 U/kg; 3 doses/day at more than 80 min intervals) were given in randomized order. The secretion of pancreatic fluid increased within 1 min after the injection of secretin, as did the concentration of bicarbonate (more than 130 mEq/liter) and the concentration of protein. Regardless of dose, the peak secretion rate and concentration occurred within the first or second 2-min period in each experiment. A short-lasting increase in protein secretion after injection of secretin is explained as a "wash-out" phenomenon. The dose of synthetic secretin required to obtain maximal secretion differed widely in 2 dogs studied, due to differences in preparation of the hormone.

3753 EFFECT OF ANTIDIURETIC HORMONE ON PANCREATIC EXOCRINE SECRETION. *(E.)*

Banks, P. A. (Mt. Sinai Sch. Med., New York City), J. Rudick, D. A. Dreiling and H. D. Janowitz. *Amer J Physiol* 215(2): 361-365, 1968.

The effects of antidiuretic hormone (ADH) (1-32 mU/kg i.v.) on pancreatic secretion were studied in 3 dogs stimulated by intermittent (1 U/kg) or continuous infusion (0.5-0.7 U/min) of secretin. Pancreatic secretion, collected in 5-min samples, was altered by ADH in the following fashion: reduction of volume output, reduction in bicarbonate output and concentration, and at times an increase in potassium concentration. Osmolality and sodium concentration did not change significantly. Amylase responses were variable. Threshold doses producing a significant alteration in secretin were 2-8 mU/kg of ADH for volume and 4-16 mU/kg for bicarbonate concentration. The principal effects of ADH were seen only in the 0- to 5-min period after injection. It seems doubtful that the effect of ADH in the dosage range used is mediated by general or local vascular effects. When ADH was administered, the reduction of bicarbonate concentration was disproportionate to the reduction in flow, suggesting that the capacity of the secreting cell to produce bicarbonate is depressed more than its ability to secrete water. Previous investigators have shown that the dosages of ADH used in this study produce circulating levels that are attainable in the dog by stimulation of endogenous ADH secretion. The site of ADH effect may be the ductular epithelium of the pancreas, resulting in movement of water by bulk flow and diffusion of electrolytes in accordance with the concentration gradient.

3754 GASTRIC SECRETORY CHANGES AFTER ANTERIOR HYPOTHALAMIC LESIONS. *(E.)*

Davis, R. A. (U. Pennsylvania Sch. Med., Philadelphia), F. P. Brooks and D. C. Steckel. *Amer J Physiol* 215(3):600-604, 1968.

Gastric fistulas were created in 48 purebred male beagle dogs. The control animals were grouped as follows: basal secretion, 18 dogs; maximal histamine-induced secretion, 6 dogs; and 6-hr insulin-induced gastric secretion, 18 dogs. Plasma hydrocortisone and glucose were determined after i.v. insulin. Stereotaxic lesions were made in the paraventricular nuclei of the medial anterior hypothalamus in 6 dogs, and in the fornices and median forebrain bundles of the lateral anterior hypothalamus in 6 other dogs. Animals with medial lesions showed no change in volume or acid concentration of basal gastric secretion during the 3-month postoperative period, but lateral lesions resulted in basal hypersecretion which was maximal at 1 month. Testing with histamine acid phosphate (3.6 µg/kg per min) produced no significant difference in the maximal 30-min acid output 1 month after either medial or lateral lesions. In insulin-induced gastric secretion, medial lesions resulted in no significant changes in volume, acid concentration or 30-min acid output, and the basal hypersecretion due to the lateral lesions was inhibited. Fasting plasma steroid levels increased significantly 1 month after the lateral operations, but showed no increase after the medial operations. During maximal insulin-induced gastric secretion, there was no statistical difference in the fasting blood sugar, in the time of minimal blood sugar, or in the onset of gastric secretion. Changes in blood glucose could possibly be a mechanism by which the ventromedial nucleus can regulate food intake. This might account for the stimulation of gastric secretion by hypoglycemia in the intact animal. It is hypothesized that anterior lateral lesions which interrupt the major afferent input to the hypothalamus could have 2 major effects: 1) destroy the control of the ventromedial nucleus over the lateral feeding center and thus alter the gastric secretory response to hypoglycemia, and 2) interrupt efferent descending pathways from the hypothalamus to brain stem vagal nuclei which probably are responsible for insuli-stimulated gastric secretion.

3755 ON THE CRITICAL NATURE OF BLOOD SUGAR LEVELS IN THE VAGAL STIMULATION OF GASTRIC ACID SECRETION IN NORMAL AND DIABETIC DOGS. *(E.)*

Kemp, D. R. (Dept. Surg., U. Florida, Gainesville), F. Herrera, J. Isaza and M. M. Eisenberg. *Surgery* 64(5):958-966, 1968.

The effect of insulin and 2-deoxy-D-glucose (2DG) on gastric acid secretion was studied in 6 fasting dogs (14-21 kg) with cannulated gastric fistulas. In control experiments, acid output usually began during the 2nd 15-min period following administration of insulin (0.15-2.0 U/kg i.v.) and reached its peak in the 3rd-5th period. The blood sugar at the end of the 2nd period ranged from 32 to 41 mg% (average 38 mg%). Acid secretion usually began during the 1st 15-min period following administration of 200 mg 2DG/kg and peaked during the 2nd 15-min period, accompanied by mild hyperglycemia (increase from 58 ± 1.5 mg% to 77 ± 4.0 mg%). After the dogs had been made diabetic with alloxan (50 mg/kg), insulin doses of 0.15-0.5 U/kg were no longer effective. Although gastric secretion was invariably stimulated with 2.0 U insulin/kg, the response was delayed and was inversely proportional to the degree of hyperglycemia. While a decrease in blood sugar to 47.2 ± 1.91 mg% was sufficient to produce gastric acid secretion in some experiments, a drop from 329 ± 33.2 mg% to 93 ± 21.6 mg% in other experiments failed to stimulate secretion, indicating that relative hypoglycemia is not sufficient. In diabetic animals with blood sugars of 300 mg% or higher, gastric secretion stimulated by administration of 200 mg/kg 2DG was either inhibited or delayed to the 6th 15-min interval, and there was no significant change in blood glucose. The potency of 2DG was apparently attenuated by the elevated blood glucose levels and the relative lack of endogenous insulin. These studies confirm the thesis that the onset of gastric acid secretion in response to insulin is dependent upon a critically low blood sugar level. The mechanism of action of 2-deoxyglucose, however, remains unclear.

3756 THE COMPLEX NATURE OF SMALL BOWEL CONTROL OF GASTRIC SECRETION. *(E.)*

Copeland, E. M. (U. Pennsylvania Med. Sch., Philadelphia), L. D. Miller and G. P. Smith. *Ann Surg* 168(1):36-46, 1968.

The secretory response to feeding in a Heidenhain pouch is known to be increased by isolation or resection of a segment of small intestine, due probably to the removal of intestinal inhibition. In order to clarify this mechanism, the effect of isolating individual segments of small bowel on the acid secretory response to a variety of stimuli was investigated in 12 male mongrel dogs with Heidenhain pouches drained by modified Gregory cannulas. Isolation of a duodenal segment (from 1 cm distal to the entrance of the greater pancreatic duct to 8 cm below the ligament of Treitz), a jejunal segment (35 cm of proximal jejunum), a duodenojejunal segment (the upper half of the small intestine), and an ileal segment (the lower half of the small intestine) increased the 24-hr acid secretion by 26%, 83%, 225% and 94%, resp.; resection of the segment had a similar effect. The 8-hr feeding response was also increased following isolation of the duodenojejunal or ileal segments, but not the duodenal or jejunal segments, and the 30-min basal secretion was increased only by isolation of the ileal segment (no basal acid was seen before or after isolation of the other segments). An increase in the maximal histamine response could be produced only by isolation of the ileum, although the submaximal histamine response was increased by 3 of the 4 procedures (decrease after isolation of the jejunal segment). There is, therefore, no evidence for release of a gastric secretogogue by any portion of the upper small intestine. Such release by the ileum remains possible, but the observed effects of ileal isolation can probably be explained by the inadequate absorption of an inhibitor.

3757 INFLUENCE OF STIMULATION OF THE CENTRAL END OF THE VAGUS NERVE ON GASTRIC SECRETION. *(E.)*

Tansy, M. F. (Temple U. Sch. Dent., Philadelphia, Pa.), R. C. Mackowiak and M. H. F. Friedman. *Surg Gynec Obstet* 127(2):259-269, 1968.

The role of the afferent fibers of the vagus nerve in reflex regulation of gastrointestinal function was studied in 57 anesthetized mongrel dogs that had undergone bilateral vagotomy. Alternate stimulation of the central ends of the vagi with monophasic square-wave impulses was continued until a maximal pressor response was reached, usually within 2 to 4 min. Electrical stimulation of the centripetal end of either the left or right vagus nerve with stimuli which evoked sympathetic circulatory changes resulted in a profuse secretion of thick, viscid, sometimes whitish mucus from the gastric antrum. This was unaffected by i.v. atropine, but the injection of dibenamine in amounts sufficient to abolish pressor responses also blocked the secretion of antral mucus. No combination of stimuli could be found which would elicit acid secretion when applied to the central vagus. In other observations, central vagal stimulation was found to produce transient apnea followed by tachypnea, elevation of arterial pressure in both normal and adrenalectomized animals, lowering of gastric tone, ileal relaxation, a mixture of inhibitory and stimulatory effects on the large intestine, and reduced biliary flow, but was ineffective in either initiating pancreatic secretion or suppressing secretin-induced pancreatic flow. The antral response to central vagal stimulation was also abolished by section of the sympathetic trunk at the thoracic level, or by section of the cervical spine. Similar stimulation of the sympathetic trunk produced effects identical to those of central vagal stimulation. While peripheral splanchnic stimulation produced secretion of mucus only from the pyloric antrum, peripheral vagus stimulation evoked mucus secretion from the corpus with stimuli of low voltage, low frequency, and moderate current, and acid secretion with stimuli of high voltage and frequency. Peripheral vagus stimulation never produced mucus secretion from the pyloric antrum. The release of gastric mucus in response to irritation of the stomach is felt to be not merely a local mechanical phenomenon, but a phenomenon involving the participation of a vagosympathetic reflex.

3758 SECRETORY RESPONSES OF TRANSPLANTED GASTRIC FUNDIC POUCHES TO PSYCHIC STIMULATION. *(E.)*

Vogelfanger, I. J. (Ottawa Civic Hosp., Ontario, Canada), W. G. Beattie, F. N. Brown, D. King, A. W. Michalchuk, A. K. Moghal and W. Watson. *Surgery* 64(4):763-768, 1968.

The secretory response to sham feeding was studied in mongrel dogs of both sexes with transplanted fundic, Heidenhain, and Bickel pouches in order to separate humoral from reflex mechanisms of acid secretion following psychic stimulation. Each successful pouch secreted 150-200 cc of gastric juice daily. The acid secretory response to sham feeding (difference between the mean total acid output for the two 15-min periods preceding stimulation and the mean total acid output for the three 15-min periods after stimulation) was as follows: in the Heidenhain pouch, 0.073-0.189 mEq before antrectomy and 0.010 mEq after antrectomy; in the Bickel pouch, 0.129-0.446 mEq before antrectomy and 0.008-0.009 mEq afterwards; in the transplanted fundic pouch (known to be totally denervated), 0.073-0.485 mEq before antrectomy and 0.000-0.275 mEq after antrectomy. The results reveal no significant difference between the 3 types of pouches and indicate that the significant acid output from a completely denervated pouch in response to psychic stimulation is solely mediated by vagal release of gastrin from the antrum.

3759 SECRETORY PROCESSES IN PERFUSED EXCRETORY DUCT OF RAT SUBMAXILLARY GLAND. *(E.)* Schneyer, L. H. (U. Alabama Med. Ctr., Birmingham). *Amer J Physiol* 215(3):664-670, 1968.

The secretory activity of the main excretory duct of the submaxillary gland was studied in anesthetized, adult-male, Wistar and Long-Evans rats under six months of age by a recently developed microperfusion technique (Young *et al.*, *Arch Ges Physiol* 295:157-172, 1967). When a colloidal carbon marker was injected into the femoral vein, carbon deposits were found along the walls of small vessels in the hilar segments of unligated ducts and in ducts previously ligated at the proximal end only, but not in the hilar segments of ducts previously ligated at both proximal and distal ends. This demonstrated the existence of a countercurrent vascular system which could provide a ductal blood supply even when the duct was ligated for retention of a perfusion catheter. Perfusion with an isotonic chloride medium (154 mM Na, 110 mM Cl, 22 mM SO_4, 32 mM mannitol and 8 mg/ml inulin) at a rate of 0.94 microliters/min resulted in the appearance of a potential difference (lumen negative) and appreciable net movements of luminal Na (efflux) and K (influx), but only small net movements of Cl (efflux) and water. The net fluxes and potential difference were stable for several hours. Perfusion with an isotonic sulfate medium (154 mM Na, 0 mM Cl, 77 mM SO_4, 115 mM mannitol and 8 mg/ml inulin) at the same rate produced a small reduction in the net fluxes of Na and K and the appearance of a slight net influx of Cl, but no change in transductal potential. The permeability of the duct was found to be low to both Cl and SO_4. The movements of Cl observed in these studies are consistent with passive mechanisms.

3760 EFFECTS OF GASTRIN AND HISTAMINE ON VAGALLY INDUCED ACID AND PEPSIN SECRETION IN ANTRECTOMIZED DOGS. *(E.)* Olbe, L. (Dept. Pharm., Karolinska Inst., Stockholm, Sweden), P. T. Ridley and B. Uvnas. *Acta Physiol Scand* 72(4):492-497, 1968.

The acid and pepsin responses to sham feeding and to gastrin (1.25-20.0 g/hr) and histamine (0.125-1.0 mg/hr) stimulation were studied in 3 Pavlov-pouch dogs following antrectomy. The acid response to sham feeding alone was 0.32 mEq/2 hr. Sham feeding alone was a more potent stimulus of pepsin secretion than either gastrin or histamine, and the pepsin responses to different doses of gastrin or histamine were essentially identical. All 3 doses of gastrin and histamine considerably increased the acid response to sham feeding, but the pepsin response to sham feeding during gastrin or histamine infusion decreased in every 15-min period with large doses of either agent. Suprathreshold doses of gastrin and histamine augmented the sham-feeding acid response by an amount corresponding to the acid output produced by suprathreshold doses of each agent when given alone. The potentiating effect of gastrin and histamine on the acid secretory response to vaga activation thus reaches its maximum at threshold doses of thes stimuli.

3761 RELATIONSHIP BETWEEN HYDROGEN ION AND PEPSIN CONCENTRATION IN HUMAN GASTRIC SECRETION. *(E.)* Lambert, R. (Ed.-Herriot Hosp. Lyon, France), F. Martin and M. Vagne. *Digestion* 1(2):65-77, 1968.

The physiological meaning of the pepsin:hydrogen ratio (P:H) and the influence of various stimulants upon it in human male were investigated under normal and pathological conditions. The gastric secretion was collected for 3 hr, 1 hr before and 2 hr after stimulation with betazole hydrochloride (Histalog), 1.5 mg/kg s.c., or insulin, 0.2 U/kg i.v. The output and concentration of both hydrogen ions and pepsin were measured in 15-min samples. The results in 12 subjects that had both secretory tests demonstrated that the effect of betazole hydrochloride on acid secretion is more rapid and more powerful than that of insulin. However, pepsin secretion was more intensely stimulated by insulin and stimulation of pepsin secretion preceded that of acid. Samples collected during the secon hour demonstrated that the P:H ratio is stable and higher after insulin than after betazole hydrochloride. No correlation was observed between the P:H ratio and either the acid output, the pepsin output, or the relation between the output after betazol hydrochloride and after insulin. Additional studies on 48 subjects (16 controls, 10 with gastric ulcer and 22 with duodenal ulcer) gave the following results: the average P:H ratio was significantly higher in gastric ulcer patients than in duodenal ulcer patients, and was still higher in the control subjects but the difference was not significant. The differences between the gastric ulcer and duodenal ulcer patients seem to depend on the relative masses of the parietal and chief cells, more than on any difference in mechanism of stimulation or vagal tone.

3762 SOME EFFECTS OF EPINEPHRINE ON HISTAMINE-INDUCED HUMAN GASTRIC SECRETION. *(E.)* Demand, H. A. (Dept. Med., U. Erlangen-Nurnberg, Germany), K. Weichmann and G. Berg. *Gastroenterology* 55(2):272-276, 1968.

The results in a total of 55 trials, 19 with a dose of 1.0 mg of epinephrine (s.c.), corresponding to a range of 10.5-17.5 μg/kg, were used to analyze the effect of epinephrine on gastric secretion against a background of submaximal histamine stimulation. The data were obtained from convalescent and student volunteers. Most conspicuous among the secretory changes was a distinct fall in gastric K concentration; this effect appeared in all cases, beginning as early as 10 min after epinephrine. The decrease usually reached its lowest point 40-60

in after epinephrine, after which a slow recovery generally
t in. .The volume rate decreased in 18 of the 19 experiments,
ith a minimum also being reached 40-60 min after epineph-
ne; thereafter it partially recovered in some cases, while in
thers it decreased to volumes insufficient for complete analy-
s. In 7 trials, a transient slight increment in volume occurred
nmediately after epinephrine, possibly because the histamine
fusion had not yet reached maximal intensity. The H ion
oncentration increased in 12 trials and decreased in 7. The
roup mean was changed significantly. The Na, Ca, and in-
rganic phosphate levels showed a strong negative correlation
ith acidity; the correlation of H with K was not significant
or concentration, but was highly significant for output. The
nly change in concentration after epinephrine which was
tatistically significant was the fall in K; however, the volume
ate and outputs for H, Cl, K, and Ca decreased significantly.

763 **STUDIES ON THE 2-COMPONENT THEORY OF GASTRIC SECRETION.** *(E.)* Ottenjann, R.
Dept. Med., U. Erlangen-Nurnberg, Germany), H. Demand and
E. Link. *Digestion* 1(2):81-84, 1968.

Quantitative analyses of the electrolytes of the gastric secretion were carried out in 67 subjects: 13 subjects received histamine only and another 13, in addition to histamine, received 630 mg of Ca (as glucolactobionate); 13 subjects were given i.v. pentagastrin only and another 13 received pentagastrin and 630 mg of Ca; and 15 subjects were given 15 mEq of K i.v. during the second hour of the histamine infusion. These studies were used to evaluate the Hollander 2-component theory that the protein- and mucus-free gastric secretion consists of two different portions: the acid parietal secretion and the nonparietal alkaline secretion of the gastric mucosa. Statistical analysis demonstrated that there was an increase in gastric Ca or K secretion in relation to the secretion of H ions following parenteral administration of Ca or K. The results support Hollander's 2-component theory of gastric secretion.

3764 **OBSERVATIONS ON THE EFFECT OF DIVERSION OF ACID FROM THE DUODENUM IN RESPONSE TO GASTRIN AND HISTAMINE.** *(E.)* Cooke, A. R. (U. California Sch. Med., Los Angeles). *Gastroenterology* 55(2):268-271, 1968.

The effect of duodenal acidification on acid secretion from a Heidenhain pouch was studied in 8 dogs with pouches and gastric fistulas. The dogs were fasted for 18 hr before each test, and an i.v. infusion of 0.15 M NaCl was maintained throughout the experiment. Gastric juice was collected for two 15-min periods to obtain basal secretion. At the end of this period, either hog gastrin or histamine was added to the saline to give the desired dosage. Maximal and submaximal acid outputs from the Heidenhain pouch in response to histamine were equal whether the gastric fistula was open or closed. The submaximal acid output in response to gastrin was greater when the gastric fistula was open. No significant differences were observed with regard to the maximal acid output when the gastric fistula was open or closed, but a higher gastrin dose was required with the gastric fistula closed.

3765 **SYNTHETIC SECRETIN: COMPARISON WITH NATURAL SECRETIN FOR POTENCY AND SPECTRUM OF PHYSIOLOGICAL ACTIONS.** *(E.)* Vagne, M. (U. California Sch. Med., Los Angeles), F. Atening, F. P. Brooks and M. I. Grossman. *Gastroenterology* 55(2):260-267, 1968.

Nineteen dogs were used to compare the effects of new synthetic and natural secretin on the stimulation of pancreatic and biliary secretion, inhibition of gastrin-stimulated secretion of acid, and inhibition of gastric motility. The new synthetic secretin eliminated the side products which decreased its activity and the modified preparation yielded a synthetic comparable to natural porcine secretin. The concentration for natural secretin was 2 U/ml and for synthetic secretin, 1 μg/ml. Nine dogs were given 3 different i.v. doses of each product to compare the effects of synthetic and natural secretin on pancreatic secretion. Eight dogs were given i.v. injections of natural and synthetic secretin to determine the effects on bile secretion. Both experiments used dose levels which varied by a factor of three; the middle dose was 3 times the lowest dose and the highest dose was 3 times the middle dose. Two dogs were used to study gastric motility changes. For each of the actions studied, synthetic secretin had a potency of 2 U/μg as compared to natural secretin. The new synthetic preparation was exactly equal on a weight to weight basis to natural secretin in stimulation of pancreatic flow: 0.1 μg/kg of either synthetic or natural secretin produced a flow of about 14 ml/15 min. These findings indicated that the actions produced by synthetic secretin are properties of secretin itself.

3766 **PANCREATIC SECRETION STIMULATED BY A GASTRIN-LIKE PENTAPEPTIDE.** *(E.)* Valenzuela, J. E. (Med. Fac., U. Chile, Santiago), M. Petermann and G. Ugarte. *Amer J Dig Dis* 13(9):767-774, 1968.

Pentagastrin-induced exocrine pancreas secretion was investigated in 18 healthy volunteers and 3 chronic pancreatitis patients; duodenal intubation was accomplished under fluoroscopic control, with an inflated balloon being used to avoid gastric contamination of duodenal content. After 2 basal secretion determinations, 10-min samples were collected for 1 hr after s.c. pentagastrin administration (6 μg/kg of body weight); volume, pH, bicarbonate, bilirubin, lipase and trypsin were measured. Slight increases in volume were seen in control subjects and pancreatitis patients after pentagastrin stimulation. In the patients, the basal secretion level reestablished itself after 20 min, while the increase levelled off in the control group. Pentagastrin's cholecystokinetic activity was demonstrated by an increase in bilirubin output in 7 of 8 controls and 1 patient; the other patients, having been cholecystectomized, showed only a slight increase. Lipase and trypsin outputs were increased in the last 40 min in the controls, and only slightly during the last 20 min in the patients. The difference between pre- and post-stimulatory secretion levels were only significant in the control group. The results indicate that after more extensive testing, pentagastrin may be of clinical value in diagnosing pancreatic insufficiency.

3767 **EFFECTS OF LYMPH DIVERSION ON THE GASTRIC SECRETORY RESPONSE TO ENDOGENOUS GASTRIN.** *(E.)* Rudick, J. (Mt. Sinai Sch. Med., New York City), T. L. Fletcher and D. A. Dreiling. *Amer J Physiol* 215(2):370-374, 1968.

Gastric acid output due to antral stimulation with 0.5% acetylcholine was studied in 9 dogs prepared with vagally denervated fundic and antral pouches. Transthoracic cannulation of the thoracic duct permitted either continuous or intermittent drainage of lymph. In 5 dogs, the duct-to-duct fistula was disconnected during antral stimulation. In 2 dogs sham operations were performed (thoracotomy without thoracic duct cannulation) to exclude the possibility of altered gastric secretory response to the trauma of surgery and anesthesia. In the 2 remaining dogs, the duct-to-duct fistula was disconnected after secretory response to antral stimulation had reached a plateau; it was reconnected 2 hr later. Lymph diversion reduced the acid output of the stimulated Heidenhain pouches by 53% with little change in acid concentration. Animals subjected to sham operations showed no reduction in their response to antral stimulation. Once the secretory plateau was reached, diversion of lymph also decreased the acid output of the stimulated pouches. The reduced response was a direct result of the thoracic duct lymph drainage and not due to fluid, protein or lymphocyte depletion. Dehydration did not occur because lymph flow was restored between observations, and i.v. saline (500 ml during each experiment) replaced fluid losses due to lymph diversion (234 ml average over 5.5 hr period) and gastric secretion. Reestablishment of lymph flow restored the secretory response to normal levels. It is stated that the degree of lymph depletion in a single experiment (42.6 ± 8.4 ml/hr) probably does not account for the reduced gastric secretory levels, butthat a gastric secretagogue which could be gastrin, may be present in the diverted lymph.

3768 THE EFFECT OF SECRETIN ON GASTRIC ACID SECRETION AND PEPTIC ULCERS INDUCED BY PENTAGASTRIN IN CATS WITH INTACT OR RESECTED DUODENUM.

(E.) Konturek, S. J. (Med. Sch., Krakow, Poland). *Amer J Dig Dis* 13(10):874-881, 1968.

The effect of natural secretin on the gastric acid response to graded doses of pentagastrin and on the production of peptic ulcers was studied in 12 cats with intact duodena and 12 cats with resected duodena. Sodium chloride (0.15 M, 20 ml/hr i.v.) was continuously infused throughout the experiment. Pentagastrin (1.0 μg/kg/hr) was added to the saline infusion after basal secretory studies and was increased 2-4 times every hr to a maximum of 32 μg/kg/hr. Secretin (2 or 4 U/kg/hr) was infused continuously during secretory studies via an additional peristaltic pump. Peptic ulcers were then produced by continuous i.v. infusion of pentagastrin (16 μg/kg/hr) for 36 hr in cats with intact duodena and for 24 hr in cats with resected duodena; secretin was also given (2 U/kg/hr) to 6 cats of each group. Acid secretion was maximal in 8 of 12 cats (intact duodenum) at 32 μg pentagastrin and in the remaining 4 cats at 16 μg; in 7 of 12 cats (resected duodenum) secretion was maximal at 4 μg pentagastrin and in the other 5 cats at 8 μg. Secretin infusion resulted in basal achlorhydria in both groups and lowered the effective doses of pentagastrin without changing the maximal acid output. Deep peptic ulcers were produced by pentagastrin infusion in 6 cats of each group while in animals receiving secretin infusions only slight edema and erosion of the mucosa occurred. Secretin does not appear to change gastric secretory activity but to increase the inflow of alkaline juices to the intestines and thus prevent peptic ulceration. The dose response curve for pentagastrin was significantly higher in animals with resected duodena and secretin infusion had almost no inhibitory effect, indicating that the duodenum is required for the full inhibitory action of secretin.

3769 THE GASTRIC MUCOUS BARRIER: INFLUENCE OF PROTEIN-BOUND CARBOHYDRATE IN MUCUS ON THE RATE OF PROTEOLYSIS OF GASTRIC MUCUS.

(E.) Menguy, R. (Div. Biol. Sci., U. Chicago, Ill.) and L. Desbaillets. *Ann Surg* 168(3):475-482, 1968.

To determine whether changes in the carbohydrate composition of gastric mucus, occurring *in vivo* under the influence of phenylbutazone or indomethacin, alter the rate of degradation of gastric mucus by endopeptidases, samples of antral mucus were collected from 4 canine gastric-antral pouches before, during, and after the administration of the drugs. The mucus secreted during the drug administration period contained significantly less carbohydrate and was more rapidly digested by pepsin or trypsin than the mucus secreted during the control and recovery periods. A negative linear correlation between the carbohydrate:protein ratio of the gastric mucus and its rate of proteolysis by trypsin or pepsin was noted. Drugs lowering the amount of bound-carbohydrate in mucus may cause peptic ulceration by rendering the mucus more easily degradable by proteolytic enzymes present in the stomach, in addition to reducing the rate of mucus secretion.

3770 IONIC CHANGES IN PAVLOV POUCHES AFTER INSULIN HYPOGLYCEMIA, GASTRIN, AND PENTAGASTRIN.

(E.) Adair, R. K. (Montreal Gen. Hosp., Quebec, Canada) and G. K. Wlodek. *Arch Surg* 97(3): 423-436, 1968.

In 55 experiments performed on 5 dogs with Pavlov pouches, polyethylene glycol was used to measure half-hourly sequential volume and ionic changes in acid-filled pouches after comparable stimulation with insulin hypoglycemia and exogenous gastrin. At least 5 6-hr trials were performed on each dog with each stimulus. Increases in volume and chloride ion content were identical after each stimulus. Sodium ions entering the pouch decreased significantly after gastrin but remained unchanged after insulin hypoglycemia. Hydrogen ions within the pouch increased markedly after gastrin and increased slightly after insulin hypoglycemia. In other studies, synthetic gastrin used as a stimulus gave results similar to those with purified gastrin. It seems that cholinergic stimulation causes acid secretion but does not affect the acidity control of the stomach, while gastrin in large doses causes acid secretion as well as decreasing the exchange of hydrogen for sodium ions across the gastric mucosa; gastrin may thus control the gastric mucosal competence. These results support Teorell's hypothesis of an exchange-diffusion of H^+ for Na^+ ions, rather than the two-component theory of Hollander.

3771 PURIFICATION OF ACTIVE MATERIAL FROM HOG GASTRIN MUCIN BY SPECIFIC PRECIPITATION WITH *VICIA CRACCA* PHYTOHEMAGGLUTININ.

(E.) Kristiansen, T. (Biochem. Inst., U. Uppsala, Sweden) and J. Porath. *Biochim Biophys Acta* 158(3):351-357, 1968.

3772 THE RELATIONSHIP BETWEEN OSMOLALITY AND ELECTROLYTES IN RAT GASTRIC

UICE FOLLOWING HISTAMINE AND INSULIN HYPO-
GLYCAEMIA. *(E.)* Lee, Y. H. (U.C.L.A. Sch. Med., Los
ngeles, Calif.) and J. H. Thompson. *Europ J Pharmacol*
(3):212-216, 1968.

3773 **MEASURES OF GASTRIC ACID SECRETION IN MAN.** *(E.)* Makhlouf, G. M. (U. Alabama
Ied. Ctr., Birmingham). *Gastroenterology* 55(3):423-429, 1968.

3774 **INTRA- AND EXTRACELLULAR FLUID SPACES, DIGESTIVE GLAND SECRETION,
ND DIURESIS.** *(Rus.)* Iesipenko, B. Ie. (Inst. Physiol.,
cad. Sci. Ukrainian SSR, Kiev) and A. P. Kostromina.
iziol Zh SSSR Sechenov 54(8):966-970, 1968.

3775 **STUDIES OF THE PROTEIN FRACTION OF THE GASTRIC JUICE BY MEANS OF PAPER
LECTROPHORESIS.** *(Rus.)* Britsis, F. A. (Latvian Inst.
Exp. Clin. Med., Riga, USSR). *Klin Lech Zlokach Novoobraz*
(10):69-77, 1964.

3776 **CHANGES IN GASTRIC SECRETION IN THE EARLY POST-VAGOTOMY PHASE.**
(E.) Gillespie, I. E. (West. Infirm., Glasgow, Scotland). *Acta
Gastroent Belg* 31(4/5):299-304, 1968.

3777 **THE INSULIN-SECRETORY ACTIVITY OF THE DUODENAL MUCOSA.** *(Fr.)* Hadjikhani,
H. (Med. Clin., U. Lausanne, Switzerland), J. Fasel, J. P. Felber
and A. Vannotti. *Helv Med Acta* 34(Suppl. 47):114-115, 1968.

3778 **THE BIOSYNTHESIS OF INTESTINAL MUCINS: THE EFFECT OF SALICYLATE ON GLYCOPROTEIN BIOSYNTHESIS BY SHEEP COLONIC AND HUMAN GASTRIC MUCOSAL TISSUES *IN VITRO*.** *(E.)* Kent, P. W. (Dept. Biochem., U. Oxford, England) and A. Allen. *Biochem J* 106(3):645-658, 1968.

3779 **THE CARBOHYDRATE COMPONENTS OF HYDROLYSATES OF GASTRIC SECRETION AND EXTRACTS FROM MUCOUS GLANDS OF THE GASTRIC BODY MUCOSA AND ANTRUM.** *(E.)* Schrager, J. (Royal Albert Edward Infirm., Wigan, Lancs., England) and M. D. G. Oates. *Biochem J* 106(2):523-529, 1968.

3780 **BIOSYNTHESIS OF INTESTINAL MUCINS: EFFECT OF PUROMYCIN ON MUCOPROTEIN BIOSYNTHESIS BY SHEEP COLONIC MUCOSAL TISSUE.** *(E.)* Allen, A. (Dept. Biochem., U. Oxford, England) and P. W. Kent. *Biochem J* 106(1):301-309, 1968.

3781 **BIOSYNTHESIS OF INTESTINAL MUCINS: SIALIC ACIDS OF SHEEP COLONIC EPITHELIAL MUCIN.** *(E.)* Kent, P. W. (Dept. Biochem., U. Oxford, England) and P. Draper. *Biochem J* 106(1):293-299, 1968.

3782 **THE RELEASE OF 5-HYDROXYTRYPTAMINE FROM RABBIT SMALL INTESTINE *IN VITRO*.** *(E.)* Gwee, M. C. E. (Dept. Pharmacol., U. Singapore) and T. S. Yeoh. *J Physiol (London)* 194(3):817-825, 1968.

3783 **FUNCTIONAL INTERRELATIONSHIPS BETWEEN TROPHIC AND SECRETORY PROCESSES IN PANCREATIC AND SALIVARY GLANDS.** *(Rus.)* Samoshkin, N. P. (Inst. Exp. Med., Acad. Med. Sci., Leningrad, USSR). *Fiziol Zh SSSR Sechenov* 54(8):961-966, 1968.

3784 **ADVANCES IN GASTRIC PHYSIOLOGY.** *(Rev.)(E.)* Silen, W. (Harvard Med. Sch., Boston, Mass.). *New Eng J Med* 277(16):864-869, 1967.

See also abstract nos.: 3695,3702,3705,3732,3796,4256,4380

3785 THE PROPERTIES OF BROMELAIN–A VEGETABLE PROTEASE FROM *ANANAS COMOSUS*. *(Ger.)* Berndt, W. (1st Med. Clin., U. Hamburg, Germany), U. Hoffmann and K. Müller-Wieland. *Z Gastroent* 6(3):185-195, 1968.

A water-soluble bromelain obtained from the pineapple was found to have a pH optimum of 6.8 when digesting casein and a weakly alkaline pH optimum when digesting synthetic peptides. Gel chromatography yielded 5 peaks, the first being an acid phosphatase and the 2nd a protease. Bromelain-protease has a molecular weight of about 22,000 (compared to 32,500 for intact bromelain) and an isoelectric point of 9.7, indicating a high content of basic amino acids. Its active center consists of cysteine-glycine-alanine-cysteine-tryptophan, and the free SH groups are essential for proteolytic activity. At 37C, bromelain shows maximum stability at pH 4.0 but the stability is good between pH 3.0 and 6.0. The enzyme is resistant to pepsin (20% loss of activity in 1 hr at 37C and pH 3.0), but degrades itself more rapidly at pH 8.0 than does crystalline trypsin (25% loss of activity in 1 hr and 75% loss in 2 hr, compared to a 15% loss in 1 hr for trypsin but a 60% loss in 1 hr for the total proteolytic activity of the duodenal contents). Bromelain is rapidly degraded by the residual duodenal proteases at pH 8.0 (75% loss of activity in 30 min), but this pH is seldom reached in the normal duodenum. Bromelain readily hydrolyzes synthetic substrates such as N-benzoylarginine or N-acetyltyrosine, but fails to attack glycylglycine, leucylglycine, leucylalanine, p-nitranilides, p-nitrophenylbutyrate, benzoylcitrulline methyl ester, or carbobenzoxyglutamine-L-phenylalaninamide. The properties of pineapple bromelain makes it unusually suitable for use as substitution therapy in patients with pancreatic insufficiency.

3786 A STUDY OF THE MECHANISMS OF INHIBITION OF PEPTIC PROTEOLYSIS BY A SULPHATED POLYSACCHARIDE. *(E.)* Martin, F. (Edouard Herriot Hosp., Lyon, France), J. L. Vuez, A. Berard, C. Andre and R. Lambert. *Digestion* 1(3):165-174, 1968.

The inhibition of the peptic hydrolysis of protein substrates by sulfated polysaccharides can be explained either by an effect on the enzyme itself (denaturation or competitive inhibition) or by the formation of a resistant complex between the polysaccharide and the substrate. In an effort to confirm the latter explanation, the effect of varying concentrations of C-16 polysaccharide (degraded carrageenan; 0.4-4.0 mg/ml) on the rate of the reaction between pepsin (0.25%) and denatured hemoglobin (5-20 mg/ml) was studied by the pH-stat technique at 37C (constant pH of 2.0). The relative inhibition produced by a given quantity of polysaccharide (expressed as a percentage decrease in the amount of 0.05 N HCl required for maintenance of a constant pH) was found to be inversely proportional to the substrate concentration. The quantity of substrate protected by a given weight of inhibitor (average 2.26 mg/mg) was independent of both the substrate and inhibitor concentrations, and indicated the likelihood of a stoichiometric reaction between molecules of inhibitor and substrate. These findings confirm previous indirect evidence for the formation of complexes between proteins and sulfated polysaccharides.

3787 STUDIES ON THE ACTIVE CENTER OF TRYPSIN: FURTHER CHARACTERIZATION OF THE HYDROPHOBIC BINDING SITE. *(E.)* Mares-Guia, M. (Tulane U. Sch. Med., New Orleans, La.), E. Shaw and W. Cohen. *J Biol Chem* 242(24):5777-5781, 1967.

3788 THE SPECIFIC INACTIVATION OF TRYPSIN BY ETHYL p-GUANIDINOBENZOATE. *(E.)* Mares-Guia, M. (Tulane U. Sch. Med., New Orleans, La.) and E. Shaw. *J Biol Chem* 242(24):5782-5788, 1967.

3789 LEUCYL-β-NAPHTHYLAMIDE-SPLITTING ENZYMES IN THE MAMMALIAN ENDOCRINE PANCREAS. *(E.)* Idahl, L. A. (Dept. Histol., U. Umeå, Sweden) and I. B. Täljedal. *Biochem J* 106(1):161-165, 1968.

3790 EFFECT OF BILE SALT ON DIGESTIVE ENZYMES OF RAT PANCREATIC JUICE. *(E.)* Vahouny, G. V. (George Washington U. Sch. Med., Washington, D. C.) and A. S. Brecher. *Arch Biochem* 123(2): 247-254, 1968.

MOTILITY

91 SMALL INTESTINE TRANSIT TIME IN THE NORMAL SMALL BOWEL STUDY. *(E.)* m, S. K. (Duke U. Med. Ctr., Durham, N. C.). *Amer J entgen* 104(3):522-524, 1968.

outine small bowel series (40% barium sulfate in water) were ne in 315 ambulatory cases (147 men and 168 women, 19- yr old) in order to evaluate normal small bowel transit time. fter upper gastrointestinal examination with 8 ounces of rium (approximately 15 min), an additional 5-8 ounces of rium was given, followed by X-ray examination every 30 in until the barium reached the cecum. The transit time nged from 15 min to 5 hr (mean 84 min). It was 2 hr or ss in 83% of the cases and only in 3 cases was it longer than hr. The times were not affected by age or sex differences. was noted that a large amount of stool in the ascending lon often delayed transit in the small intestine, and this was ore noticeable in diabetic patients.

792 TONIC SUPRASPINAL MECHANISMS INFLUENCING THE INTESTINE–INTESTINAL NHIBITORY REFLEX. *(E.)* Johannson, B. (Dept. Physiol., . Goteborg, Sweden), O. Jonsson and B. Ljung. *Acta Physiol cand* 72(3):200-204, 1968.

n 15 chloralose or chloralose-urethan anesthetized, vagotomized ats, 2 separate loops of jejunum with intact blood and nerve upply were prepared. The motility of one loop was recorded n terms of volume changes, while the other loop was used for liciting the intestino-intestinal inhibitory reflex by graded disensions. After a number of control values were obtained, esions were created at the mesencephalic and cervical levels f the spine, and their effect on the intestino-intestinal inhibtory reflex was noted. The results indicate that the autonomic eflex is subject to facilitation from suprabulbar areas and to trong tonic suppression from bulbar structures.

3793 THE EFFECT OF ELEVATED BODY TEMPERATURE AND OF STRESS ON THE MOTILITY OF STOMACH AND COLON IN MAN. *(E.)* Misiewicz, J. J. (Central Middlesex Hosp., London, England), S. L. Waller, R. H. Fox, R. Goldsmith and T. J. Hunt. *Clin Sci* 34(1):149-159, 1968.

Gastric and colonic motility were studied in 21 normal males with controlled body temperatures of 37.0 (normal), 37.5, 38.0, 38.5, and 39.0C, and also during stress induced by hand immersion in an ice-water mixture. Gastric motility was determined by an ingested radiotelemetering capsule used to measure the intraluminal pressure (IP) and muscle activity (MA); only the IP was used to measure colonic motility. The capsule was located by the frequency of contraction, 3/min for gastric activity and more than 3/min for colonic activity. The amplitude and duration of each IP peak were measured and a motility index (MI) was calculated. Body temperature was regulated by the controlled hyperthermia technique, and it was monitored by thermistors placed in the external auditory canal. At raised body temperature stomach motility was inhibited while colonic motility was not. At 38.0C and above, the fall in the gastric MI was significant. Inhibition of MA was significant only at 38.5C and 39.0. The colonic MI at 37.5C and 39.0C did not differ significantly from normal levels (37.0C). The ice test produced no measureable effect on colonic and gastric MI. As the inhibition increased, the contractions became too feeble to elevate gastric IP, but enough movement of the radio capsule was produced to record MA. Respiration and somatic movement were noted to have no effect on the observed changes in gastric motility. The mechanism of this inhibition is not clear but the vagus nerve may be involved, based on the results of previous studies showing that vagal stimulation inhibits gastric motility.

3794 ELECTROMYOGRAPHIC STUDY ON THE MECHANISM OF DELAYED GASTRIC EMPTYING AFTER VAGOTOMY IN DOGS. *(E.)* Nagoka, K. (Tohoku U. Sch. Med., Sendai, Japan). *Tohoku J Exp Med* 95(1):1-13, 1968.

The mechanism of delayed gastric emptying after vagotomy was studied in 30 adult dogs. Water (37-38C, 200 ml/30 sec every 30 min until 1000 ml had been infused) was infused by stomach tube before and after vagotomy. The duodenum was ligated 10 cm distal to the pyloric ring to prevent the outflow of water, and the head of the operating table was elevated 25° to prevent the reflux of water into the esophagus. Before vagotomy, increasing the intragastric pressure resulted in increased gastric motility, spasm-like abnormal excitation of the pyloric stomach and antiperistalsis. After vagotomy, the degree of hyperactivity of the pylorus was decreased and the stomach required a larger volume of water (200 ml) to induce the same degree of excitation of the pylorus as that before vagotomy, probably due to the hypomotility and hypotonicity of the stomach. The hypomotility led to gastric stasis and retention of gastric content which caused a higher intragastric pressure and incited spasm-like abnormal excitation and antiperistalsis. It is concluded that pylorospasm occurred secondarily as a result of the gastric stasis due to vagotomy.

3795 ANALYSIS OF THE ILEOCAECAL EMPTYING MECHANISM IN THE RAT. *(E.)* Johansson, H. (Acad. Hosp., Uppsala, Sweden) and G. Nylander. *Acta Chir Scand* 134(3/4):296-302, 1968.

The ileocecal passage of a radioactive test meal labeled with $Na_2\,{}^{51}CrO_4$ was studied by calculating the distribution of radioactivity in the isolated gastrointestinal tracts of 263 male Sprague-Dawley rats (183-233 g in weight), sacrificed 60-405 min after deposition of the meal in the stomach. Each isolated tract was divided into 13 segments (stomach, cecum, colon, and 10 segments of small intestine) and the radioactivity of each segment recorded with a scintillation detector. Planimetric analysis revealed a rapid accumulation of radioactivity in the distal portion of the ileum, followed by gradual transfer into the cecum. Thus, when only 60 min had elapsed, 87% of the dose had already been evacuated from the stomach and most of the radioactivity was in the 6th-9th segments of the small intestine. The proportion of radioactivity found in the cecum increased from 2% at 75 min to 45% at 405 min, while the percentage of the radioactive dose found in the remainder of the colon increased from a negligible amount at 135 min to 28% at 405 min. The results, which were analyzed mathematically by a quotient method, revealed that in the early stages in the distal redistribution of the test dose, only the proximal portions of the small intestine were engaged in effective propulsive motility, while during the latter stages, the distal portions were also engaged in propulsive motility. The propulsive motility of the distal ileum seems to consist of a constant advancement of the small intestinal contents which have accumulated in front of the ileocecal valve. In contrast to the emptying pattern of the stomach, which is exponential, the ileocecal passage is well adapted to a linear function ($y = 0.21\ x - 12.24$).

3796 **GASTRIC SECRETION AND GASTRIC EMPTYING: A COMPARATIVE STUDY OF THE EFFECTS OF DICYCLOMINE, GLYCOPYRROLATE AND ATROPINE, USING A NEW TESTING TECHNIQUE.** *(E.)* Saiphoo, C. (Toronto Western Hosp., Canada), J. R. Bingham and W. D. Cramp. *Canad Med Ass J* 99(10):489-493, 1968.

The effects of dicyclomine (0.133 mg/lb s.c.), glycopyrrolate (0.00133 mg/lb s.c.) and atropine (0.01 mg/lb s.c.) on gastric secretion and gastric emptying were studied in 30 patients (24 men and 6 women), including 22 with duodenal ulcers, by the method of two successive test meals; the difference in response to the two meals was also determined in 20 unselected ambulatory controls who received no drug. Each test meal, which was withdrawn 30 min after its introduction by stomach tube, consisted of 750 ml water at 35C and pH 6.5 containing 60 mg/liter of phenol red as a marker and 35 g/liter of sucrose to provide a suitable osmolarity. The drugs were given 20 min after introduction of the first test meal, and the 2nd meal was given 15 min after withdrawal of the first. The mean decreases between the first and 2nd test meal in controls and in patients given dicyclomine, glycopyrrolate or atropine, resp., were 16.2, 67.8, 97.7 and 114.7 ml/30 min in gastric emptying rate, 0.69, 2.40, 7.10 and 7.78 mEq/30 min in gastric acid secretion, 2.40, 5.0, 10.1 and 11.5 mEq/30 min in chloride secretion, 8.1, 18.6, 46.4 and 53.6 ml/30 min in calculated parietal secretion, and 10.4, 17.6, 20.3 and 20.6 ml/30 min in calculated nonparietal secretion. Side effects such as dryness of the mouth (caused by dicyclomine in 13 of 30, by glycopyrrolate in 16 of 30, and by atropine in 24 of 30), blurred vision (caused by dicyclomine in 5 of 30, by glycopyrrolate in 2 of 30, and by atropine in 7 of 30), and pulse changes (slight reduction after dicyclomine or glycopyrrolate, significant acceleration after atropine) were noted. Thus, although glycopyrrolate has fewer side effects than atropine, it is just as effective in reducing gastric acid secretion and motility. Dicyclomine, on the other hand, has both fewer side effects and less effect on gastric secretion and motility.

3797 **BARIUM STIMULATION OF ESOPHAGEAL SMOOTH MUSCLE.** *(E.)* Christensen, J. (U. Iowa Coll. Med., Iowa City). *Proc Soc Exp Biol Med* 128(1): 109-112, 1968.

An *in vitro* study was made of the effect of barium on circular smooth muscle from the distal esophagus of the cat in an attempt to ascertain whether the excitatory effect of barium on the muscle was due to excitation of local nerves or to a direct effect of barium on the muscle itself. The magnitude of the contractile response was found to be dose-related. Because the dose-response curve was not affected by atropine, hexamethonium, nicotine or the β-adrenergic stimulant isoproterenol, it was concluded that the response of the muscle to barium was the result of a direct action on the muscle rather than of the stimulation of neural elements.

3798 **ENDORADIOSONDE STUDIES OF INTESTINAL MOTILITY AT ST. ERIK'S HOSPITAL, STOCKHOLM, 1962-1966.** *(E.)* Barany, F. R. (St. Erik's Hosp., Stockholm, Sweden). *T Gastroent* 11(1):11-24, 1968.

3799 **X-RAY MOTION PICTURE STUDY OF THE ANO-RECTAL REGION: AN X-RAY MOTION PICTURE STUDY OF ANAL CONTINENCE AND DEFECATION.** *(Fl.)* Kerremans, R. (St. Rafael Hosp., Louvain, Belgium). *T Gastroent* 11(1):81-91, 1968.

3800 **CHANGES IN THE PERIODIC MOTOR ACTIVITY OF THE STOMACH AFTER TRANSSECTION OF THE INTESTINE AT VARIOUS LEVELS.** *(Rus.)* Isakhanov, G. I. (Inst. Norm. Path. Physiol., Acad. Med. Sci., Moscow, USSR). *Biull Eksp Biol Med* 66(7):45-49, 1968.

3801 **EFFECT OF SODIUM DEOXYCHOLATE ON GASTRIC EMPTYING IN THE RAT.** *(E.)* Feldman, S. (Dept. Pharm. State U. New York, Buffalo), R. J. Wynn and M. Gibaldi. *J Pharm Sci* 57(9):1493-1497, 1968.

3802 **A RELATION BETWEEN THE CHAIN LENGTH OF FATTY ACIDS AND THE SLOWING OF GASTRIC EMPTYING.** *(E.)* Hunt, J. N. (Guy's Hosp. Med. Sch., London, England) and M. T. Knox. *J Physiol (London)* 194(2):327-336, 1968.

3803 **THE SLOWING OF GASTRIC EMPTYING BY MONOSACCHARIDES AND DISACCHARIDES IN TEST MEALS.** *(E.)* Elias, E. (Guy's Hosp. Med. Sch., London, England), G. J. Gibson, L. F. Greenwood, J. N. Hunt and J. H. Tripp. *J Physiol (London)* 194(2):317-326, 1968.

3804 **THE ORIGIN OF ACETYLCHOLINE RELEASED FROM GUINEA-PIG INTESTINE AND LONGITUDINAL MUSCLE STRIPS.** *(E.)* Paton, W. D. M. (Dept. Pharmacol., U. Oxford, England) and M. A. Zar. *J Physiol (London)* 194(1):13-33, 1968.

3805 **ON THE MOTOR FUNCTION OF THE LARGE INTESTINE AFTER STIMULATION OF DUODENAL RECEPTORS.** *(Rus.)* Vorobieva, N. M. *Biull Eksp Biol Med* 33(9):11-14, 1968.

06 **THIOACETAMIDE INHIBITION OF LIVER AND SERUM AMYLASE PRODUCTION.** *(E.)* Geachin, R. L. (U. Louisville Med. Sch., Kentucky) and P. H. se. *Proc Soc Exp Biol Med* 127(4):985-987, 1968.

le Sprague-Dawley rats were given thioacetamide in 0.9% Cl (20 mg/ml intraperitoneally or 10 mg/ml via stomach be). Daily dosages were 50, 100 and 200 mg/kg of body ight for 3, 9, or 21 days. Control rats received similar sages of physiological saline. All rats were sacrificed 1 day er the last feeding. Thioacetamide administration halved er and serum amylase levels. The lowest dosage (50 mg/kg ily) caused acute liver damage. Larger doses did not cause a rther significant lowering of liver amylase levels, while serum ylase levels were somewhat lower. *In vitro*, thioacetamide l not affect serum amylase activity. This study confirms evious findings that damage done to the liver by N-nitroso- nethylamine lowered liver amylase levels and decreased ility by the liver to synthesize amylase.

807 **BILIRUBIN CONJUGATION BY HEPATIC MICROSOMES FROM ADULT MALE GUINEA IGS.** *(E.)* Lage, G. L. (Coll. Med., U. Iowa, Iowa City) and L. Spratt. *Arch Biochem* 126(1):175-180, 1968.

order to determine the bilirubin glucuronyltransferase tivity under various conditions, microsomes isolated from the vers of adult male guinea pigs by high-speed centrifugation 05,000 x g for 45 min) of a KCl homogenate were incubated KCl in the presence of bilirubin, uridine diphosphoglucuronic cid (UDPGA) and Tris-buffer at 37C under nitrogen. The rate f bilirubin conjugation was found to be optimal at about pH .0, and to decrease markedly with time after about 60 min of ncubation. Conjugation was directly proportional to the JDPGA concentration, and was inhibited by high concentra- ions of magnesium. The maximal rate was approximately 0-30 μg of bilirubin per gram equivalent of liver tissue per hr.

3808 **LIVER REGENERATION IN THE HYPOPHYSECTOMIZED RAT: INFLUENCE OF CORTI- COSTEROIDS ON THE SIZE DISTRIBUTION AND SYN- HESIS OF RIBOSOMAL COMPONENTS.** *(E.)* Webb, T. E. McGill U. Cancer Res. Unit, Montreal, Canada) and L. R. Vozney. *Arch Biochem* 125(1):69-75, 1968.

n both intact and 20-day hypophysectomized male Sprague- Dawley rats, the early phases of liver regeneration following 67% epatectomy are characterized by increased incorporation of abel from 6-^{14}C-orotic acid into ribosomal RNA and changes n the size distribution of ribosomal components. In hypophysectomized rats, however, administration of pharmacological doses of hydrocortisone hemisuccinate (20-250 mg/kg/dose) resulted in marked inhibition of the incorporation of labeled orotic acid into ribosomal RNA and partial breakdown of the polyribosomes in the regenerating liver within 20 hr after hepatectomy, even though similar treatment had no effect on these processes in resting liver. In intact rats, regenerating liver tissue was also unaffected by hydrocortisone. Preliminary studies indicate that the effects of hydrocortisone on proliferating tissue may be counteracted by growth hormone.

3809 **FORMATION OF BILE ACIDS IN MAN: CONVERSION OF CHOLESTEROL INTO 5β-CHOLESTANE-3α,7α,12α-TRIOL IN LIVER HOMOGENATES.** *(E.)* Bjorkhem, I. (Dept. Chem., Karolinska Inst., Stockholm, Sweden), H. Danielsson, K. Einarsson and G. Johansson. *J Clin Invest* 47(7):1573-1582, 1968.

The mechanisms of the conversion of cholesterol into bile acids in man were studied by examining the metabolism of cholesterol-1,2-^{3}H, cholest-5-ene-3β,7α-diol-7β-^{3}H, tritium-labeled 7α-hydroxycholest-4-en-3-one, 7α,12α-dihydroxycholest-4-en-3-one, and cholest-5-ene-3β,7α,12α-triol in fractions of liver homogenates. The 20,000-g supernatant fluid catalyzed the conversion of cholesterol into cholest-5-ene-3β,7α-diol, 7α-hydroxycholest-4-ene-3-one, 7α-12α-dihydroxycholest-4-en-3-one, and 5β-cholestane-3α,7α,13α-triol. In the presence of microsomal fraction fortified with NAD^{+}, cholest-5-ene-3β,7α-diol was converted into 7α-hydroxycholest-4-en-3-one; when this fraction was fortified with NADPH, small amounts of cholest-5-ene-3β-7α,12α-triol were formed. 7α-Hydroxycholest-4-en-3-one was metabolized into 7α-12α-dihydroxycholest-4-en-3-one in the presence of microsomal fraction fortified with NADPH, and into 5β-cholestane-3α,7α-diol in the presence of 100,000-g supernatant fluid. Cholest-5-ene-3β,7α,12α-triol was converted into 7α,12α-dihydroxycholest-4-en-3-one in the presence of microsomal fraction fortified with NAD^{+}. The 100,000-g supernatant fluid catalyzed the conversion of 7α,12α-dihydroxycholest-4-en-3-one into 5β-cholestane-3α,7α,12α-triol. The sequence of reactions in the conversion of cholesterol into 5β-cholestane-3α,7α-diol and 5β-cholestane-3α,7α,12α-triol; the subcellular localization of the enzymes; and the cofactor requirements were all found to be the same as those described for rat liver.

3810 **BILIRUBIN METABOLISM IN EXPERIMENTAL LIVER INJURY.** *(E.)* Garay, E. A. R. (Inst. Gastroent., Natl. Inst. Hlth., Haedo, Argentina) and J. P. Campa. *J Lab Clin Med* 72(4):582-591, 1968.

The biliary excretion of bilirubin in anesthetized, CCl$_4$-treated rats after a single injection of conjugated or unconjugated bilirubin was studied. The biliary output of both forms of bilirubin was found to be greatly reduced in the CCl$_4$-injured rats. Delayed hepatic uptake of pigment was partially responsible for the mechanism. Serial collections of bile made for 3 to 4 hr after administration of a large dose of unconjugated bilirubin in CCl$_4$-treated animals which had reacted from anesthesia showed a delay in bilirubin excretion, although the the total 3- to 4-hr output exceeded the amount of pigment excreted by normal rats. Conjugated bilirubin gave the same results. Hepatic vascular blood volume was measured in both groups of rats by the injection of ^{51}Cr-labeled erythrocytes; the CCl$_4$-treated rats showed a markedly lower amount of radioactivity over the hepatic area than did normal rats. Injection of reserpine increased the hepatic radioactivity and induced a rapid biliary output of bilirubin-^{14}C in the CCl$_4$-treated rats.

3811 THE EFFECT OF BILIARY OBSTRUCTION IN THE RAT ON SULPHOBROMOPHTHALEIN METABOLISM AND HEPATIC STORAGE. *(E.)* Andrews, W. H. H. (London Hosp., Med. Coll., England) and I. D. R. Lozano. *Brit J Exp Path* 49(4):340-347, 1968.

The livers of rats 18-21 days after creation of a chronic biliary obstruction were compared with those of controls. The livers of the rats with biliary obstruction weighed twice as much, and extracted far less dye from plasma after i.v. injection of BSP than did those of the controls. It was found that ability to excrete bilirubin and BSP into bile is abolished in chronic biliary obstruction. There also appeared to be inhibition of the mechanism which facilitates the passage of BSP from sinusoids into hepatocytes. The ability of the liver to conjugate and store BSP did not seem to be affected by chronic biliary obstruction. It appears that normal livers have the ability to alter the molecule of unconjugated BSP, while livers with chronic biliary obstruction have lost this ability.

3812 EFFECT OF MAGNESIUM DEFICIENCY ON BLOOD AND LIVER TRANSKETOLASE ACTIVITY AND ON THE RECOVERY OF ENZYME ACTIVITY IN THIAMINE DEFICIENT RATS. *(E.)* Zieve, L. (Minneapolis Vet. Hosp., U. Minnesota), W. M. Doizaki and L. E. Stenroos. *J Lab Clin Med* 72(2):268-277, 1968.

Rats fed a magnesium-deficient diet showed a slight decrease in blood transketolase activity and a marked decrease in liver transketolase activity. Liver thiamine concentration decreased significantly and magnesium concentration remained normal. In thiamine- and magnesium-deficient rats, the liver transketolase recovery in response to thiamine was half that seen in purely thiamine-deficient rats. The addition of $MgSO_4$ produced no additional effect. *In vitro*, the addition of thiamine pyrophosphate to blood from thiamine-deficient rats resulted in sharp recovery of transketolase activity, but only in animals which were not also magnesium-deficient. *In vitro* addition of $MgSO_4$ had no effect. Similar results were noted in rats drinking 10% alcohol in place of water: liver transketolase activity decreased rapidly in thiamine deficiency and gradually in magnesium deficiency. The depressed liver transketolase activity seen after 2 months of magnesium deficiency did not respond to vigorous magnesium replacement over a 2 week period. It is suggested that the effects of magnesium deficiency are due to interference with apoenzyme activation.

3813 PROTECTIVE EFFECTS OF ALPHA-TOCOPHEROL ON THE HEPATOTOXICITY OF CARBON TETRACHLORIDE: AN ELECTRON MICROSCOPE STUDY. *(E.)* Meldolesi, J. (Inst. Pharmacol., U. Milan, Italy). *Exp Molec Path* 9(1):141-147, 1968.

Liver sections prepared from fasted, male, Sprague-Dawley rats poisoned with CCl_4 (2.5 ml/kg p.o. 24 hr before sacrifice) were compared with those from similar rats pretreated with alpha-tocopherol (125 mg/kg i.p. 72, 48 and 26 hr before sacrifice) before the administration of CCl_4. As expected, CCl_4 alone produced fatty infiltration, mitochondrial swelling, dilatation and degranulation of the rough endoplasmic reticulum, and formation of large masses of tightly-packed smooth membranes, all of which were more severe in the centrilobular than in perilobular cells. Pretreatment with alpha-tocopherol, however, uniformly decreased the degree of damage, so that the perilobular cells appeared almost normal. It is concluded that lipid peroxidation is the principal mechanism of CCl_4 hepatotoxicity, and that alpha-tocopherol acts by preventing the oxidation of structural lipids. Since the increase in smooth vesicles seemed to be greater than the decrease in rough elements of the endoplasmic reticulum in both groups of rats, it is suggested that CCl_4 not only induces the transformation of rough to smooth endoplasmic reticulum but also brings about a net increase in the synthesis of smooth endoplasmic reticulum membranes.

3814 A STUDY OF ENERGY-LINKED CALCIUM TRANSPORT IN LIVER MITOCHONDRIA DURING CCl_4 INTOXICATION. *(E.)* Carafoli, E. (Inst. Gen. Path., U. Modena, Italy) and R. Tiozzo. *Exp Molec Path* 9(1): 131-140, 1968.

After administration of CCl_4 (0.5 ml per 200 g p.o.) to adult albino rats, the calcium concentration in the liver mitochondria increased sharply (beginning 2-3 hr after poisoning), to a maximum of about 1000% in 18-20 hr, after which it gradually fell to normal in about 60 hr. If radioactive calcium (10 μC/10 g i.p.) was administered to the poisoned rats 5 min before sacrifice, however, the specific activity of the liver mitochondri was significantly lower than in controls. It therefore appears that CCl_4 poisoning increases both the labile calcium pool in the liver mitochondria and the fraction of mitochondrial calcium which is not available for equilibration with extramitochondrial calcium. *In vitro* studies confirmed that calcium uptake by mitochondria is, at least in part, an energy-requiring process, and showed that CCl_4 has no effect on the absolute capacity of the liver mitochondria to take up calcium; rather, CCl_4 poisoning markedly inhibits the release of calcium which is normally produced by agents such as pentachlorophenol and dinitrophenol (uncouplers of oxidative phosphorylation). This effect, rather than an exchange of potassium for calcium, is the most probable explanation for the accumulation of calcium in the liver mitochondria after poisoning with CCl_4.

3815 INHIBITION OF DEOXYRIBONUCLEIC ACID SYNTHESIS IN REGENERATING RAT LIVER BY BERYLLIUM. *(E.)* Witschi, H. (Coll. Med., U. Cincinnati, Ohio). *Lab Invest* 19(1):67-70, 1968.

In the regenerating livers of male rats subjected to partial hepatectomy 28 hr before sacrifice, i.v. administration of beryllium sulfate (7.5-100 mg/kg 5-28 hr before sacrifice) significantly depressed the incorporation of thymidine-2-^{14}C (1.5 μC i.p. 2 hr before sacrifice) into liver DNA. A straight-line relation was obtained between the concentration of Be in the liver and the percent radioactivity incorporated into DNA, even though this dosage of Be did not produce frank necrosis and did not interfere with hepatic regeneration *per se*. Incorporation of orotic acid-6-^{14}C (2 μC i.p. 30-90 min before sacrifice) into DNA was also inhibited by Be, even though Be had no effect on either incorporation of the same precursor into RNA or incorporation of leucine-^{14}C (1.0 μC i.p. 30 min before sacrifice) into liver protein. Administration of magnesium at doses of up to 4.0 mg per rat failed to counteract the toxicity of beryllium. Beryllium, the mechanism of action of which remains unknown, was most effective when administered shortly after hepatectomy.

3816 EFFECT OF ADRENALECTOMY AND HYPOPHYSECTOMY ON RESPONSES OF RAT LIVER ENZYMES TO HIGH-PROTEIN DIETS. *(E.)* Freedland, R. A. (Sch. Vet. Med., U. California, Davis). *Canad J Biochem* 46(10):1253-1260, 1968.

Neither adrenalectomy nor hypophysectomy prevented the usual increase in liver arginase, arginine synthetase, serine dehydratase, glutaminase, glutamic-oxalacetic transaminase, fumarase, glucose-6-phosphatase, tyrosine-alpha-ketoglutarate transaminase, histidase or glutamic-pyruvic transaminase produced by 5 days on a high-protein diet (90% casein) in male Sprague-Dawley rats, although in some cases (glucose-6-phosphatase and tyrosine-alpha-ketoglutarate transaminase for either operation; serine dehydratase and glutamic-oxalacetic transaminase in the case of hypophysectomy only) the response to a high-protein diet was decreased; in the case of arginine synthetase, histidase, glutamic-oxalacetic and glutamic-pyruvic transaminase, the response to the high-protein diet was significantly greater after adrenalectomy. Following adrenalectomy, a high-protein diet also produced an increase in liver phosphoglucomutase (which is usually decreased by such a diet), although the normal decreases in liver phosphorylase, 6-phosphogluconate dehydrogenase, uridine diphosphoglucose dehydrogenase and alpha-glycerophosphate dehydrogenase were not affected by prior adrenalectomy. Prior hypophysectomy abolished the normal decrease in liver 6-phosphogluconate dehydrogenase and phosphoglucomutase produced by a high-protein diet and converted the normal decrease in uridine diphosphoglucose dehydrogenase and alpha-glycerophosphate dehydrogenase into an increase. Three enzymes (glyceraldehyde-3-phosphate dehydrogenase, p-hydroxyphenylpyruvic oxidase and malic enzyme) which are normally not affected by a high-protein diet increased when the diet was preceded by hypophysectomy, as did glutamic dehydrogenase, malic dehydrogenase and p-hydroxyphenylpyruvic oxidase after adrenalectomy and a high-protein diet, but malic enzyme decreased on a high-protein diet after adrenalectomy. Endocrine surgery had no significant effect on the response of the relative liver weight, soluble liver protein or liver glycogen to a change in diet, although the total liver protein, which normally increases slightly on a high-protein diet, increased by 23% after hypophysectomy and showed no change after adrenalectomy. It should be noted that pre-induction levels of many of these liver enzymes were decreased by adrenalectomy or hypophysectomy, although histidase and glutamic-pyruvic transaminase were increased by hypophysectomy, and uridine diphosphoglucose dehydrogenase was increased by either operation.

3817 EFFECT OF APPLE AND PECTIN DIETS ON SERUM AND LIVER CHOLESTEROL IN RATS. *(E.)* Karvinen, E. (Inst. Occup. Health, Helsinki, Finland) and M. Miettinen. *Acta Physiol Scand* 72(3):62-64, 1968.

Serum and liver cholesterol levels were determined in male rats fed isocaloric diets containing 46.4 g unpeeled apple or 2 g pectin per day for 4 weeks. Serum cholesterol levels of rats on the apple diet were significantly lower than that of controls; there was no significant difference between rats on the pectin diet and controls. Liver cholesterol levels were not significantly altered in either group. Uptake of cholesterol-4-^{14}C into liver unsaponifiable lipid was lower in both groups than in the control group, due presumably to a reduced absorption of cholesterol from the intestine.

3818 CHAIN EXTENSION OF RIBONUCLEIC ACID BY ENZYMES FROM RAT LIVER CYTOPLASM. *(E.)* Wilkie, N. M. (Dept. Biochem., U. Glasgow, Scotland) and R. M. S. Smellie. *Biochem J* 109(4):485-494, 1968.

The incorporation of ribonucleotides into polyribonucleotides by the soluble fraction and the microsomal fraction of rat liver was studied. The 105,000 g supernatant fraction of rat liver catalyzed the incorporation of ribonucleotides from ribonucleoside triphosphates into polyribonucleotide material. The reaction required Mg^{++} ions and was enhanced by the addition of an ATP-generating system. RNA, ATP, uridine triphosphate (UTP), and cytidine triphosphate (CTP) but not guanidine triphosphate (GTP) were utilized in the reaction. The UTP product was predominantly a homopolymer containing 2-3 uridine residues. The microsomal fraction of rat liver incorporated ribonucleotides from ATP, GTP, CTP, and UTP into polyribonucleotide material. This reaction required Mg^{++} ions and was slightly enhanced by the addition of an ATP-generating system, and by RNA but not DNA. Supplementation of the reaction mixture with the 3 complementary ribonucleoside 5'-triphosphates greatly increased the utilization of a single labelled ribonucleoside 5'-triphosphate. The optimum pH was 7.0-8.5, and the reaction was strongly inhibited by inorganic pyrophosphate and to a lesser degree by inorganic orthophosphate. It was not inhibited by actinomycin D or by deoxyribonuclease. The reactions seem to lead predominantly to homopolymer synthesis, but the possibility of some heteropolymer formation is not completely excluded.

3819 THE MOBILIZATION OF GLUCOSE AND OF FREE FATTY ACIDS IN THE ISOLATED AND PERFUSED RAT LIVER UNDER THE INFLUENCE OF HUMAN GROWTH HORMONE. *(E.)* Milcou, S. M. (Inst. Endocrinol., Acad. Soc. Rep. Rumania, Bucharest), E. Costiner, L. Vaisler and L. Simionescu. *Rev Roum Endocr* 5(3):223-228, 1968.

The effect of human growth hormone on glucose and free fatty acid concentrations in the perfusate obtained by perfusion of isolated rat liver *in vitro* was studied. Growth hormone in doses of 1-5 mg resulted in hyperglycemia, the degree of which depended upon the respective dosage. A higher degree of hyperglycemia was encountered using livers removed from rats pretreated with daily doses of 5 mg of growth hormone for 5 days. In both pretreated and untreated animals, 5 mg of growth hormone in the perfusion medium resulted in an increased release of free fatty acids.

3820 FORMATION OF BILIRUBIN IN THE DOG SPLEEN.

(E.) Backlund, L. (Inst. Physiol. Med. Biophys., U. Uppsala, Sweden) and M. Michaelsson. *Acta Physiol Scand* 72(3):322-326, 1968.

The bilirubin concentration in venous blood from the spleen, central venous blood, and arterial blood was determined in dogs during normal conditions and after destruction of red blood cells. Red cells were destroyed by infusion of nicotinic acid or were provided by infusion of stored citrated blood. In 13 dogs, 1 blood sample was taken from the abdominal aorta, the inferior vena cava, and the splenic vein, resp. In 6 dogs, additional blood samples were taken after i.v. injection of nicotinic acid; 4 of these dogs had infusions of 14-24 day-old citrated blood 70-140 min after the nicotinic acid injection. Plasma free hemoglobin and bilirubin determinations were made on all samples. In the control period the mean values of the plasma bilirubin concentration were: 1) splenic vein blood 0.10 mg% (range 0.0-0.28 mg%), 2) arterial blood 0.06 mg% (range 0.0-0.17 mg%), and 3) central venous blood 0.08 mg% (range 0.0-0.24 mg%). After nicotinic acid injection, a slight but significant rise in the bilirubin content of the splenic vein was noted. No further increases were seen beyond the 60th min after nicotinic acid injection. No differences were found in arterial or central venous blood. Similar effects were seen following infusion of stored citrated blood. Plasma free hemoglobin values were higher after injection of nicotinic acid and stored citrated blood in all blood samples. These results indicate that the spleen, under certain circumstances, can produce bilirubin.

3821 INFLUENCE OF HYPOXIA, GLUCOCORTICOID, AND ENDOTOXIN ON HEPATIC ENZYME INDUCTION.

(E.) Berry, L. J. (Dept. Biol., Bryn Mawr Coll., Pa.), D. S. Smythe, L. S. Colwell and P. H. C. Chu. *Amer J Physiol* 215(3):587-592, 1968.

The livers of female Swiss-Webster mice were analyzed for the effect of hypoxia alone (controls) or in combination with glucocorticoid or *Salmonella* endotoxin on the production of glycogen, tryptophan oxygenase, and tyrosine-α-ketoglutarate transaminase. Fasting mice were exposed for 17 hr to simulated altitudes ranging from sea level to 28,900 ft (760, 400, 350, 320, 285, 260, and 235 mm Hg). Although the tryptophan oxygenase activity was significantly increased in control mice exposed to altitudes of 22,000 to 27,000 ft (320 to 260 mm Hg), as well as in mice given 5 mg cortisone acetate s.c. at the beginning of exposure to the lower altitudes, the activity was significantly diminished at altitudes from 24,750 to 28,900 ft (285 to 235 mm Hg). Tryptophan oxygenase activity in mice given 0.5 ml *Salmonella typhimurium* (SR-11) endotoxin i.p. immediately before exposure to hypoxia was below control levels at all altitudes. A progressive rise in tyrosine-α-ketoglutarate transaminase with increasing altitude was observed in all 3 groups, and levels were consistently higher in cortisone- or endotoxin-treated mice. Although the liver glycogen level rose to a maximum of 6% at 22,000 ft (320 mm Hg) in control mice and to a maximum of 12% in mice given cortisone, it did not increase in mice given endotoxin. The cortisone group also showed an increase over the control group in oxidized pyridine nucleotides at all altitudes below 27,000 ft (260 mm Hg). Survival in the hypoxic control group was 100% at altitudes up to 22,000 ft (320 mm Hg), but dropped to less than 50% at 28,900 ft (235 mm Hg). While the mortality rate in the cortisone mice was very low at all altitudes, the mortality in the endotoxin mice increased with rising altitude from 2.5% at sea level (760 mm Hg) to 90% at 28,900 ft (235 mm Hg).

3822 HEPATIC AMINO ACID LEVELS AND LIVER DISEASE.

(E.) Bien, E. J. (Meadowbrook Hosp. East Meadow, N. Y.), V. S. Palladino and A. Riley. *Proc Soc Exp Biol Med* 129(1):206-207, 1968.

Samples of human liver, obtained at autopsy from 54 patients, were analyzed for 16 amino acids, and adjacent areas were evaluated histologically to determine whether qualitative and quantitative changes in proteins elaborated by the liver (due to liver dysfunction) result in an alteration of the hepatic tissu protein. Tabulated results showed no correlation between histological structural changes and the amino acid composition of dried defatted hepatic tissue. There was no significant difference in the amino acid levels (μmoles/100 mg of liver) between normal and fatty livers.

3823 METABOLISM OF A TRACER DOSE OF PALMITATE-C^{14} BY LIVER OF NORMAL AN DIABETIC RATS PERFUSED WITH AND WITHOUT THE ADDITION OF INSULIN.

(E.) Haft, D. (New York Med. Coll., N. Y.). *Metabolism* 17(9):818-824, 1968.

Livers of fed-normal, fasted-normal, and alloxan-diabetic, male Wistar rats, weighing 220-360 g and previously maintained on a standard laboratory diet, were isolated and perfused with a tracer dose of palmitate-1-^{14}C, with and without insulin, to determine the effect of insulin on the hepatic oxida tion of lipid. The diabetic animals also received 1.5 U of protamine zinc insulin/day up to 44 hr before sacrifice. A small (20%) average decrease in the yield of respiratory $^{14}CO_2$ was caused by insulin with livers of fasted normal rats; this occurred when the tracer was infused continuously but not when it was injected into the animal before perfusion, and there was no insulin effect on fat oxidation using fed or diabetic animals. Insulin significantly stimulated fatty acid synthesis, as indicated by the incorporation of acetate-^{3}H into liver fatty acids in the same livers in which fatty acid oxidation was only slightly inhibited. The possibility that this discrepancy was due to oxidation and synthesis taking place in different cell types was ruled out by a separate set of experiments using acetate-1-^{14}C in which parenchymal and Kupffer cells were separated magnetically after perfusion. The major conclusion from these experiments is that the prompt decrease in ketogenesis seen after *in vivo* administration of insulin is no explained by a direct inhibitory action of the hormone on fat oxidation in the liver.

3824 RELATIONSHIP OF NUTRITIONAL AND HORMONAL INFLUENCES ON LIVER ENZYME ACTIVITY.

(E.) Freedland, R. A. (Dept. Physiol. Sci. U. California, Davis), S. Murad and A. I. Hurvitz. *Fed Proc* 27(5):1217-1222, 1968.

The interactions between adrenocortical hormones, thyroxine, and dietary protein or carbohydrate in determining the activity of hepatic enzymes responsible for the metabolism of amino acids, carbohydrates and lipids were studied in intact, adrenalectomized or thyroidectomized rats maintained on protein-free, 25%-protein, 90%-protein or high-fructose diets for 5 days, combined in some cases with administration of exogenous thyroxine or cortisol. The relative increase in glutamic-pyruvic transaminase (GPT), glutamic-oxaloacetic transaminase (GOT) and serine dehydratase (SD) in response to a high-protein diet was not affected by adrenalectomy, indicating that glucocorticoids play no significant role in this increase, but was markedly decreased by simultaneous cortisol (probably because the activity of these enzymes was already near maximal in cortisol-treated rats). The usual increase in glucose-6-phosphatase (GPh) in response to a high-protein diet was decreased by adrenalectomy and abolished by simultaneous cortisol. Additional studies with variable dietary protein levels showed that the protein content is very important in determining the response of hepatic GPT and GOT to cortisol, but has no effect on the response of GPh to the same steroid. While the GOT response was independent of the thyroxine level in the animal, the response of GPT and SD to a high-protein diet was decreased by thyroxine and increased by thyroidectomy. Similarly, the increase in GPh on a high-protein diet was decreased by thyroxine (although it was unaffected by thyroidectomy), and the increases in glucose-6-phosphate dehydrogenase (GPhD) and 6-phosphogluconate dehydrogenase (PhGD) were increased by thyroidectomy and abolished by thyroxine (in the presence of exogenous thyroxine, the enzyme levels decreased on a high-protein diet). Malic enzyme activity in the liver decreased on a high-protein diet in both intact and thyroxine-treated rats, while after thyroidectomy the diet had no effect. The usual response of GPh and the dehydrogenases to fructose feeding was also inhibited by exogenous thyroxine. It thus seems that dietary protein is not needed for the thyroxine-stimulated increase in dehydrogenases (which depends on the presence of dietary carbohydrate) and malic enzyme, but is relatively important for the increase in GPh and PhGD. Many of the increases in enzymatic activity in response to diet are independent of the adrenal and thyroid hormones, although there seems to be an interaction between dietary protein and cortisol with regard to the enzymes associated with amino acid metabolism. It is emphasized that the effects of hormones on enzyme activity cannot be properly evaluated without considering the nutritional condition of the animal, so that future studies of this type should be carried out with the use of well-defined semipurified diets providing a range of carbohydrate and protein levels, rather than commercial laboratory chow.

3825 **SYSTEMIC OSCILLATIONS IN METABOLIC FUNCTIONS IN LIVER FROM RATS ADAPTED TO CONTROLLED FEEDING SCHEDULES.** *(E.)* Potter, V. R. (U. Wisconsin Med. Sch., Madison), E. F. Baril, M. Watanabe and E. D. Whittle. *Fed Proc* 27(5):1238-1245, 1968.

The effect of a controlled feeding schedule on health and metabolism was studied in laboratory rats fed for only 8 hr in each 48 and compared with two groups of controls: fed either ad libitum or for 8 hr in each 24. It was found that the two control groups gained weight equally, while the experimental group weighed about a third less and showed different liver enzyme levels. It is concluded that the experimental group were unable to eat enough in 8 hr to get them through the next 40 hr with a net fat deposition equal to that in the controls. While not proven in this study, it is suggested that the experimental feeding group may have been in better condition than the controls. It was noted that since the animals under the "8 hr in 48" feeding schedule were more consistent in their responses, the use of such schedules may have important advantages in metabolic and physiologic studies.

3826 **STUDIES ON MYOINOSITOL: EFFECT OF MYOINOSITOL ON THE CHOLESTEROL METABOLISM OF RATS SUFFERING FROM EXPERIMENTAL FATTY LIVER.** *(E.)* Kotaki, A. (U. Nagoya, Showa-ku, Nagoya), T. Sakurai, M. Kobayashi and K. Yagi. *J Vitamin* 14(2):87-94, 1968.

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3830 **ACTIVITY AND INTRACELLULAR DISTRIBUTION OF ENZYMES OF KETONE-BODY METABOLISM IN RAT LIVER.** *(E.)* Williamson, D. H. (U. Oxford, England), M. W. Bates and H. A. Krebs. *Biochem J* 108(3):353-361, 1968.

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3870 **LYSINE, HEMOCITRULLINE, AND HOMOARGININE METABOLISM BY THE ISOLATED PERFUSED RAT LIVER.** *(E.)* Ryan, W. L. (Eppley Inst., U. Nebraska, Omaha), A. J. Barak and R. J. Johnson. *Arch Biochem* 123(2):294-297, 1968.

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3873 **EFFECTS ON HEPATIC MICROSOMAL N- AND C-OXYGENATION OF AROMATIC AMINES BY *IN VIVO* CORTICOSTEROID OR AMINOFLUORENE TREATMENT, DIET, OR STRESS.** *(E.)* Arrhenius, E. (Wenner-Gren Inst. Exp. Biol., U. Stockholm, Sweden). *Cancer Res* 28(2):264-273, 1968.

3874 **METHYLATION OF RIBONUCLEIC ACID AND DEOXYRIBONUCLEIC ACID AND TUMOUR INDUCTION IN LIVERS OF HYPOPHYSECTOMIZED RATS TREATED WITH DIMETHYLNITROSAMINE.** *(E.)* Lee, K. Y. (Chicago Med. Sch., Chicago, Ill.) and C. M. Goodall. *Biochem J* 106(3):767-768, 1968.

3875 RIBONUCLEASE ACTIVITY OF RIBONUCLEOPROTEIN PARTICLES ISOLATED FROM LIVERS OF RATS FED 4-DIMETHYLAMINOAZOBENZENE, PRIMARY LIVER TUMORS, AND NOVIKOFF HEPATOMA. *(E.)* Arora, J. S. (Cancer Inst., Montreal, Canada) and G. de Lamirande. *Cancer Res* 28(2):225-227, 1968.

3876 METABOLIC ADAPTATIONS IN RAT HEPATOMAS: SOME PROPERTIES OF APOTRYPTOPHAN PYRROLASE OF RAT LIVER AND TWO HEPATOCELLULAR CARCINOMAS. *(E.)* Cho-Chung, Y. S. (Med. Sch., U. Wisconsin, Madison) and H. C. Pitot. *Cancer Res* 28(1):66-70, 1968.

3877 DEFECTIVE DIETARY CONTROL OF FATTY ACID METABOLISM IN FOUR TRANSPLANTABLE RAT HEPATOMAS: NUMBERS 5123C, 7793, 7795, AND 7800. *(E.)* Sabine, J. R. (Dept. Physiol. Anat., U. California, Berkeley), S. Abraham and H. P. Morris. *Cancer Res* 28(1):46-51, 1968.

3878 STUDIES ON RESPIRATION AND GLYCOLYSIS IN TRANSPLANTED HEPATIC TUMORS OF THE RAT. *(E.)* Lo, C. H. (Fels Res. Inst., Temple U. Sch. Med., Philadelphia, Pa.), V. J. Cristofalo, H. P. Morris and S. Weinhouse. *Cancer Res* 28(1):1-10, 1968.

3879 DIVERSITY AND NATURE OF RIBOSOMAL POOLS IN HEPATOMA 7800 AND HOST LIVER. *(E.)* Kwan, S. W. (McGill U. Cancer Res. Unit, Montreal, Canada), T. E. Webb and H. P. Morris. *Biochem J* 109(4):617-623, 1968.

3880 INACTIVATION OF 5-HYDROXYTRYPTAMINE IN RATS. *(E.)* Heikkinen, E. S. (U. Oulu, Finland). *Acta Physiol Scand* (Suppl. 311):1-82, 1968.

3881 DIFFERENCES IN THE LIPID PATTERN OF T-TUBE AND GALLBLADDER PUNCTURE BILE IN SURGICAL PATIENTS. *(E.)* Turner, D. A. (Hosp. Sick Child., Toronto, Canada) and U. K. Misra. *Clin Biochem* 2(1):13-24, 1968.

See also abstract nos.: 4452,4519,4521,4522,4523,4525

DIAGNOSTIC PROCEDURES AND GENERAL THERAPY

882 **COMPARISON OF INTRAMUSCULAR AND ORAL AMPICILLIN THERAPY FOR SHIGEL-OSIS.** *(E.)* Haltalin, K. C. (U. Texas Southwest. Med. Sch., allas), J. D. Nelson, H. T. Kusmiesz and L. V. Hinton. *J ediat* 73(4):617-622, 1968.

learing of Shigellae from the stools was significantly more rapid nean 0.8 days) in 24 infants and children (18 males and 6 emales, 0.5-5.0 yr old) treated with intramuscular ampicillin 0 mg/kg followed by 25 mg/kg 4 times daily for 5 days) than 33 patients (22 males and 11 females) treated orally at the ame dosage (mean of 2.1 days); both groups were predomin-ntly Negro and all had severe shigellosis with a similar distribu-on of serotypes (mostly *S. flexneri* 2a). The main symptoms ere fever (over 102F in 18 of 24 and 21 of 33 cases), fecal lood, vomiting, convulsions, mild dehydration and abdominal ain; most were treated within 7 days after the onset of symp-oms. Excretion of Shigellae for more than 48 hr after onset f treatment was seen in 1 of 24 and 3 of 33, but 92% of the atients treated i.m. had negative cultures within 24 hr com-ared to 67% in the orally treated group. Changes in the in-estinal flora were also different in the two groups: whereas atients treated orally were more likely to show replacement y Candida sp., those treated parenterally were more apt to how overgrowth with Klebsiella or Aerobacter; Enterobacter-aceae and fecal streptococci were eliminated in both groups. ther clinical data were similar in the two groups, with clinical ailures in 4 of 24 and 2 of 33, resp., and secondary septicemia n 2 of 24 and 1 of 33. One of the patients treated i.m. had relapse 3 days after cessation of treatment, and another de-eloped a generalized macular rash on the 4th day of treatment which cleared promptly after withdrawal. By either route, the luration of antibiotic therapy should be as brief as possible to void prolonged disruption of the normal enteric flora.

3883 **FATAL COMPLICATIONS DURING PERCUTANEOUS BIOPSY OF THE LIVER WITH THE MENGHINI NEEDLE.** *(Ger.)* Lindner, H. (DRK Hosp., Hamburg, Germany). *Acta Hepatosplen* 15(3):177-185, 1968.

Analysis of the replies to a questionnaire completed by 99 German-speaking clinicians revealed a mortality rate of 0.015% among 79,381 liver biopsies performed with the Menghini needle. These 12 fatal cases, which are described individually, were due to bleeding (7 cases), bile peritonitis (3 cases) and pneumothorax (2 cases). In addition, there were 273 nonfatal complications, yielding a morbidity rate of 0.34%. A brief analysis of 15 other fatalities during percutaneous liver biopsy (reported from other sources) revealed 7 more due to bleeding, 5 due to bile peritonitis, 2 due to pneumothorax, and one due to anaphylactic shock from the prophylactic administration of a hemostyptic agent. Attention is called to the possibility of bleeding from a diaphragmatic artery. It is concluded that the risk of liver biopsy has been markedly diminished by introduction of the Menghini needle, but it should always be kept in mind that percutaneous liver biopsy can be fatal (this was not realized by 38 of the 99 physicians). The risk is especially great in elderly, cachectic, severely ill patients, in metastatic cancer of the liver, and in patients with obstructive jaundice.

3884 **EXPERIMENTAL STUDY OF THE RESPECTIVE EFFECTS OF ACETYLSALICYLIC ACID, HYDROCORTISONE, AND EPSILON-AMINOCAPROIC ACID ON BLEEDING TIME.** *(Fr.)* D'Auteuil, P. (Hematol. Lab., Hotel-Dieu, Quebec, Canada), Y. Gauthier, M. Sirois and S. C. Martin. *Union Med Canada* 97(9):1177-1181, 1968.

In 40 patients of both sexes, hospitalized for various reasons, the bleeding time was determined by the standardized method of Ivy *et al (J. Lab. Clin. Med.,* 26:1812, 1941) both before and (on the following day) 2 hr after the administration of placebo, acetylsalicylic acid (125 mg p.o.), hydrocortisone (100 mg i.v.), epsilon-aminocaproic acid (2.0 g i.v.), or combinations of the 3 agents. The pretreatment bleeding time varied from 4.0 to 23.5 min, being within normal limits (9 min or less) in 26 cases. The posttreatment bleeding time varied from 1.5 to 24.0 min and was within normal limits in 21 cases, having been "normalized" by the treatment in 4 cases (given aspirin + hydrocortisone, hydrocortisone + epsilon-aminocaproic acid, and all 3 drugs (2 cases), resp.) and made abnormal in 9 (given placebo (2 cases), aspirin (2 cases), hydrocortisone, aspirin + hydrocortisone, aspirin + epsilon-aminocaproic acid (2 cases) and all 3 drugs, resp.). A detailed statistical analysis of these results indicated that the bleeding time is significantly increased by aspirin, so that the gastrointestinal hemorrhages often ascribed to aspirin may be due not only to a local effect on the gastric mucosa but also to a systemic effect on blood coagulation. Both hydrocortisone and epsilon-aminocaproic acid are able to counteract the effect of aspirin, even though epsilon-aminocaproic acid alone had no significant effect on the bleeding time; the bleeding time was decreased significantly by hydrocortisone alone.

3885 **PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY: A STUDY OF 115 CASES.** *(E.)* Turner, F. W. (U. Alberta Hosp., Edmonton, Alberta, Canada),and L. B. Costopoulos. *Canad Med Ass J* 99(11):513-521, 1968.

Percutaneous transhepatic cholangiography (PTC) was attempted in 115 jaundiced and nonjaundiced patients, with success in 89 (77%). Eight complications occurred: significant bile leakage in 5 cases; subcapsular hematoma in 2 cases; and pneumothorax in 1 case. All 5 cases with bile leakage had extrahepatic biliary obstruction. In 10 patients with hepatocellular jaundice, the demonstration of a normal extrahepatic biliary tree obviated the need for laparotomy. Since in 9 nonjaundiced patients, the ducts could be visualized in only 3 and all of these were radiologically normal, PTC was not felt to be of value in investigating nonjaundiced patients. PTC attempted on a 6 week old infant to evaluate congenital biliary atresia was most unsatisfactory. Attempts to use the cannula as an external biliary fistula met with little success. Due to the possible complications of bile leakage, any patient in whom biliary obstruction is demonstrated should undergo surgery within 4 to 6 hr after the procedure; no patient should thus be subjected to PTC who is not fit to undergo surgery. It was felt that PTC performed in selected patients with jaundice the cause of which cannot be established by other means, is a safe and valuable diagnostic procedure.

3886 **STUDIES OF FECAL LIPIDS BY MEANS OF THIN-LAYER CHROMATOGRAPHY: TECHNIQUE AND RESULTS IN HEALTHY SUBJECTS.** *(Ger.)*

Erb, W. (1st Med. Clin., U. Frankfurt/Main, Germany) and E. Bohle. *Z Klin Chem* 6(5):379-382, 1968.

A method is described for the separation and quantitative determination of fecal lipids by thin-layer chromatography of the chloroform-methanol extracts on silica gel using various proportions of n-hexane (70-90 parts/101.5), diethyl ether (10-30 parts/101.5) and glacial acetic acid (1.5 parts). This technique provides a good separation of sterols, free fatty acids, mono-, di- and triglycerides, methyl esters of fatty acids, and esterified sterols. The amounts excreted can be determined quantitatively by direct photodensitometry after spraying the chromatogram with 20% H_2SO_4 and heating to 180C for 90 min. In 18 healthy subjects on an unrestricted mixed diet (1500-2500 calories/day), the total lipid excreted in the feces (weighing 85-176 g/day, average 122 g) was 1.82-11.38 g/day (average 4.49 g/day), of which 29.1-58.8% (average 42.1%) was nonesterified sterols, 2.7-18.9% (average 9.4%) was esterified sterols, 1.4-20.5% (average 8.9%) was triglycerides, 23.2-45.0% (average 33.3%) was free fatty acids, and 2.1-12.1% (average 6.3%) was phospholipids.

3887 FRACTIONAL GASTRIC SECRETION STUDIES: A COMPARISON OF pH VALUES AND CLINICAL UNITS.

(Sp.) Valbuena, L. (Cent. Hosp., Maracaibo, Venezuela) and E. Molina. *GEN* 22(3):215-221, 1968.

The results of pH measurements and classification based on the response to Topfer's reagent and phenolphthalein (arbitrary clinical units) were compared in samples of Histalog-stimulated gastric juice (1.7 mg/kg) obtained from 15 normal volunteers and 85 patients with duodenal (11) or gastric (8) ulcers, stomach cancer (11), hiatus hernia (29), "irritable duodenum" (4), atrophic gastritis (13) or intestinal parasites (9). Among 16 of these subjects with apparently normal gastric acidity, the gastric pH was consistently between 1.0 and 2.49 (1.5-2.49 in 14 of 16). Among 68 cases with apparent hyperchlorhydria (acidity of 50 clinical units or higher), 33 had pH values between 1.0 and 1.49 and 34 had values between 1.5 and 2.49, while one had a pH above 2.5; even among the 20 subjects with Grade IV hyperchlorhydria (more than 100 clinical units of gastric acid), 11 had a pH of 1.0-1.49 and 9 had a pH of 1.5-2.49. Among 16 cases with a diagnosis of achlorhydria due to a finding of "0" clinical units of acid in all samples, only 7 had a gastric pH above 6.0 and 5 were found to have a pH of 3.5 or below ("false achlorhydria"). These 16 cases included 8 with stomach cancer, 4 of whom had true achlorhydria while 3 had "achlorhydria with normal proteolytic activity" (pH of 3.5-4.5) and one had false achlorhydria. It is concluded that determinations of gastric pH can be very important in the diagnosis of achlorhydria, although they may provide no clear distinction between normal subjects and those with clinical hyperchlorhydria.

3888 THE MORPHOLOGICAL BASIS OF SOME OF THE X-RAY SYMPTOMS OF NONSPECIFIC ULCERATIVE COLITIS.

(Ger.) Ruderman, A. J. (Cent. Inst. Postgrad. Med., Moscow, USSR) and S. A. Ginzburg. *Radiol Diagn* 9(3):321-329, 1968.

A comparison of the radiological and histological findings in 25 cases of nonspecific ulcerative colitis (20 surgical specimens and 5 autopsy studies) revealed destructive processes in 24 cases, including 2 with only scattered areas of erosion. In 4 cases, the mucosa was completely destroyed, leaving a completely flat submucosal surface interrupted by numerous pseudopolyps (the remnants of the mucosa). Based on this comparison, it is pointed out that exulceration may be lacking, not only in the early stages but even in late ulcerative colitis, and that on the other hand, ulcers seen in the pathological specimen may not be seen radiologically if they are either very large and flat or very small and deep. Serration of the intestinal contour is good evidence of exulceration and the presence of pseudopolyps, but should not be looked upon as the single pathognomic sign of such ulceration. Intestinal stenosis was seen in 15 of the 25 cases, all of whom had chronic disease. Of the other 10, 7 had acute disease and 3 had chronic disease in the stage of acute exacerbation. Sclerosis of the submucosa and hypertrophy of the tunica muscularis were encountered in almost all chronic cases and none of the acute cases. However, the localization and severity of the stenosis could be correlated with marked or moderate submucosal sclerosis in only 7 of 13 and 3 of 6 cases, resp., and with marked or moderate hypertrophy of the tunica muscularis in only 4 of 8 and 3 of 6 cases, resp. Marked stenosis was seen in 8 of 9 cases with a previous ileostomy. However, such stenosis cannot be ascribed purely to fibrosis, scar formation or atrophy of the wall due to inactivity, but must also involve an increase in intestinal tone.

3889 THE COMPARATIVE STUDY OF VARIOUS DIAGNOSTIC METHODS FOR EARLY GASTRI CANCER IN JAPAN.

(E.) Kuroyanagi, S. (Natl. Cancer Ctr. Hosp., Japan). *Asian Med J* 11(7):473-488, 1968.

Among 100 cases of early gastric cancer diagnosed during a 3-yr period, 83% were detected by X-ray, 83% by endoscopy, 57 of 83 (68.6%) by cytological examination, 27 of 28 by biopsy, 87% by a combination of X-ray and endoscopy, 77 of 83 (92.7%) by a combination of X-ray, endoscopy and cytolog and all 28 by a combination of all four procedures. The most common incorrect diagnosis by either X-ray or endoscopy was gastric ulcer (10 of 17 and 12 of 17 cases, resp.). X-ray diagnosis was successful in 17 of 19 with protruding cancers, 5 of 5 with superficial elevated cancers, 2 of 4 with superficial flat cancers, 46 of 55 with superficial depressed cancers, and 13 of 17 with excavated cancers (classification of the Japanese Gastro enterological Endoscopy Society, 1962). Ten of the 17 missed cancers were 9 cm^2 or less in area. Endoscopic diagnosis was successful in 17 of 19, 4 of 5, 2 of 4, 47 of 55, and 13 of 17, resp., and 11 of the 17 missed cancers were 9 cm^2 or less in area. Cytological diagnosis (gastric washing or brushing) was successful in 14 of 16 with protruding cancers, 3 of 5 with superficial elevated cancers, 3 of 4 with superficial flat cancers, 33 of 44 with superficial depressed cancers, and 6 of 14 with excavated cancers; 17 of the 26 missed cancers were 9 cm^2 or less in area. Among the 77 cases successfully diagnosed by a combination of X-ray, endoscopy and cytology, 48 were detected by all 3 methods, 17 by 2 methods, and 11 by only one method (X-ray in 4, cytology in 5, endoscopy in 2 cases); 5 of the 6 missed cancers were 9 cm^2 or less in area. The one canc which was missed by biopsy (a superficial depressed cancer 15 cm^2 in area located in the pyloric antrum) was detected by all 3 other methods. It is concluded that diagnosis by a combination of 3 or 4 methods is most effective. By any method, owever, the detection of superficial flat or excavated cancers nd cancers having an area of 1 cm^2 or less remains extremely ifficult.

390 RADIOLOGICAL AND HISTOLOGICAL PARALLELS IN GASTRITIS. *(Ger.)* Gruptschev, . (Inst. Postgrad. Med., Sofia, Bulgaria) and N. Nikolov. *adiol Diagn* 9(3):331-336, 1968.

A comparison of the radiological and histological findings in 00 patients (52 men and 48 women, 21-70 yr old) revealed greement in only 12 of 35 histologically normal cases and 2 f 65 patients with various forms of gastritis. The group inluded 8 patients with chronic hepatitis or cirrhosis, 15 with holecystitis or giardiasis, 5 with gastritis alone, 24 with gastrouodenal ulcers, 14 with a previous gastrectomy, 20 with hronic enteritis, 6 with ulcerative colitis, and 8 with generalzed atherosclerosis. Of the 35 patients with a histologically ormal gastric mucosa, 23 showed the coarse mucosal relief n the gastric X-ray which is usually referred to as hypertrophic astritis but which must now be considered to have no morphoogical basis. Such coarse mucosal relief was also seen in 13 f the 14 cases with a previous gastrectomy, 16 of 20 with uperficial gastritis, 35 of 41 with atrophic gastritis, and 3 of 4 with total atrophy of the gastric mucosa. An atrophic relief was not seen in any case, and normal X-ray findings were reported in 4 cases of superficial gastritis, 6 of atrophic gastritis nd 1 of complete gastric mucosal atrophy. It is concluded hat a diagnosis of gastritis cannot be made in the absence of a biopsy (except in the case of erosive gastritis), since the X-ray picture is not determined by the glandular layer of the gastric mucosa. However, gastric radiology remains useful in the differential diagnosis of localized gastric diseases such as ulcers and cancer.

3891 RADIOLOGICAL AND HISTOLOGICAL PARALLELS IN CHRONIC ENTERITIS. *(Ger.)* Nikolov, N. (Inst. Postgrad. Med., Sofia, Bulgaria) and V. Gruptschev. *Radiol Diagn* 9(3):337-344, 1968.

A comparison of the radiological and histological findings in the jejunal mucosa of 60 patients (27 males and 33 females, 11-70 yr old) examined during the period 1962-65 revealed agreement in 7 of 12 cases with a histologically normal mucosa and in 39 of the 48 others, including all 9 with subtotal mucosal atrophy. The group included 6 cases of nutritional and digestive allergy, 3 with celiac disease, 4 with idiopathic sprue, 30 with chronic enteritis (in some cases secondary to other diseases), 14 with enteritis and previous gastrectomy, and 3 cases of regional ileitis. The most common radiological findings were a coarse mucosal relief, irregular folds, and fractionation of the contrast medium. Signs of small intestinal dyskinesia and hyper- or hypotonia were more common than direct signs of mucosal pathology. It is concluded that the intestinal relief is determined both by the inflammatory changes in the mucosa and by the tone of the muscularis, and that agreement between histological and radiological findings is most likely in the most abnormal cases.

3892 METHODS FOR THE QUANTITATIVE STUDY OF THE AEROBIC AND ANAEROBIC INTESTINAL BACTERIAL FLORA OF MAN. *(E.)* Floch, M. H. (Yale U. Sch. Med., New Haven, Conn.), W. Gershengoren and L. R. Freedman. *Yale J Biol Med* 41(1):50-61, 1968.

Methods for the isolation, identification, and quantitation of the fecal bacterial flora are described and results obtained in 8 healthy volunteers (21-40 yr old) are reported. An emulsified specimen (0.1 g or 0.1 ml) of fresh fecal material in 9.9 ml norite A charcoal water was serially diluted and concentrations ranging from 10^{-2} to 10^{-8} were streaked on 8 selective media and incubated at 37C under aerobic, anaerobic and/or microaerophilic conditions. Colonies were counted, stained and, in some instances, subcultured in order to identify the microorganisms. The average numbers of total aerobes, total anaerobes, coliforms, streptococci, lactobacilli, and Bacteroides found per gram of feces (expressed as the log to the base 10) were 7.2 ± 0.25, 9.4 ± 0.51, 7.1 ± 0.84, 6.4 ± 1.06, 8.2 ± 1.43, and 9.4 ± 0.60, resp., in addition to scattered clostridia, diphtheroids and *Veillonella* spp. Bacteroides were thus the most common, while coliforms and lactobacilli showed the greatest individual variation. Variation in bacterial isolation techniques and identification criteria have hampered correlation of data from different studies in the past.

3893 THORACIC DUCT CANNULATION AND DIFFERENTIAL DIAGNOSIS OF OBSTRUCTIVE JAUNDICE. *(E.)* Witte, M. H. (Washington U. Sch. Med., St. Louis, Mo.), W. R. Cole, D. F. Burton, L. Alvarez and A. E. Dumont. *JAMA* 204(5):366-370, 1968.

Thoracic duct cannulation in the neck was performed prior to exploratory abdominal surgery, operative cholangiography and liver biopsy in 23 patients presenting with obstructive jaundice of unclear etiology. Normal lymph flow and end pressure (0.82 ± 0.25 cc/min and 5-15 cm H_2O, resp.) were present in 4 of 5 patients with benign duct obstruction (mean 1.03 cc/min), in all 4 patients with malignant bile duct obstruction without distant spread (0.75 cc/min), and in all 3 patients with cholangiolitic hepatitis (0.53 cc/min); in contrast, decreased lymph flow (0.1 cc/min) was present in all 6 patients with advanced malignant obstruction of the extrahepatic biliary tract and metastastis to the liver, peritoneum, and distant lymph nodes, and markedly increased lymph flow (4.8 cc/min) was present in 5 patients with Laennec's cirrhosis. Data on the flow, pressure, and composition of thoracic-duct lymph can aid in the etiological diagnosis of obstructive jaundice.

3894 SERUM SIALIC ACID ESTIMATION AS AN AID IN DIFFERENTIATING HEPATOCELLULAR FROM OBSTRUCTIVE JAUNDICE. *(E.)* Singh, R. (G.S.V.M. Med. Coll., Kanpur, India), B. Ramaraju, B. K. Sur, D. S. Gahlaut and S. N. Agrawal. *Indian J Med Res* 56(6):867-870, 1968.

Serum sialic acid levels were determined by the thiobarbituric acid method after hydrolysis of the serum proteins in 61 cases of jaundice admitted to the Lala Lajpat Rai Hospital in Kanpur, India. Compared to an average control value of 58.0 mg% in healthy Indians, the serum sialic acid was elevated to 77.5 mg% (range 68-96) in 34 cases of infectious hepatitis, 76 mg% (range 70-86) in 9 cases of hepatic cirrhosis, 102 mg% (range 92-114) in 15 patients with common bile duct stones and 123.5 mg% (range 121-126) in 3 cases with carcinoma of the head of the pancreas. The average value was thus 76.8 mg% in hepatocellular jaundice compared to 112.5 mg% in obstructive jaundice, which represents a statistically significant difference. Although elevation of serum glycoproteins has been attributed to tissue proliferation, tissue destruction, and a systemic response to stress mediated through the pituitary-adrenal axis, the exact explanation for the rise in serum sialic acid in these two groups is not clear.

3895 **HISTAMINE IN FOODS CAUSING FALSE POSITIVE SCRATCH TESTS.** *(E.)* Doeglas, H. M. G. (St. Franciscus Hosp., Rotterdam, Netherlands) and J. P. Nater. *J Allerg* 42(3):164-168, 1968.

When scratch tests were performed with undiluted pure foodstuffs in 20 normal volunteers, negative tests were obtained with tomato, raw meat, fish, and wine, but positive urticarial reactions resulted from 3 yeast extracts, some brands of sauerkraut, sardines kept in an open plastic container at room temperature for several weeks, some cheeses, and the control solution of 0.1% histamine HCl. When the relation between the histamine content of cheese and the results of the scratch test was studied in the same 20 subjects, the individuals varied in their reactions to histamine, but the reactions to cheese and to histamine were parallel in each subject. The histamine concentration in the cheeses varied from 50-100 mg/100 g dry matter, and was particularly high in cheeses prepared with rennet contaminated with salt-resistant lactobacilli. Since the histamine content of certain foods may therefore lead to a false-positive diagnosis of food allergy on the basis of a scratch test, the necessity of using dialyzed extracts in such tests is emphasized.

3896 **IMMUNOLOGIC SCREENING TEST FOR CARCINOMA OF THE PANCREAS.** *(E.)* Weiland, D. E. (Maricopa County Gen. Hosp., Phoenix, Ariz.), D. J. Kuntz and D. Childers. *Amer J Surg* 116(5):700-703, 1968.

A relatively simple immunologic test is proposed for the early diagnosis of pancreatic malignancy using the supernatant of dialyzed saline extracts prepared from histologically normal, inflamed or malignant pancreas. When 115 sera (from 51 normal blood donors, 8 patients with carcinoma of the pancreas, 16 patients with other malignancies, 15 with diabetes mellitus, 15 with collagen diseases, and 10 with pancreatitis) were tested against pancreatic extracts by electroimmune diffusion on cellulose acetate strips, 17 sera (including 7 from patients with pancreas cancer, 5 from patients with other malignancies and 5 from pancreatitis patients) demonstrated a positive reaction (appearance of a precipitin band in the gammaglobulin region of the electrophoretically separated serum proteins) to at least 1 pancreatic extract. Normal and pancreatitic pancreas extracts reacted positively with all 17 sera except with those from 3 patients with carcinoma of the pancreas; malignant pancreas extracts reacted positively with all sera except with the sera from 2 patients with pancreatitis. However, previous absorption of the sera with normal and inflamed pancreatic extracts abolished the positive reactions in all sera except those from patients with pancreatic carcinoma, and these were abolished by absorption with malignant pancreatic extract. Absorption of the specific reactive antibody by malignant pancreatic extract, but not by normal extract, is thus diagnostic of carcinoma of the pancreas.

3897 **CLINICAL TRIAL OF ORAL 2-DEHYDROEMETINE DIHYDROCHLORIDE IN HEPATIC AMOEBIASIS.** *(E.)* Shanker, A. (Ghandi Med. Coll., Bhopal, India) and B. N. Bisarya. *Antiseptic* 65(6):423-427, 1968.

2-Dehydroemetine dihydrochloride (50-60 mg/day p.o. for 7-2 days in the form of enteric-coated tablets) was administered to 38 patients (30 men and 8 women, weighing 88-150 pound with hepatic amebiasis (37), intestinal amebiasis with dysenter and griping (17 of the previous 37), and intestinal amebiasis without visceral complications (1). Five patients who initially received 10 mg t.i.d. showed unsatisfactory progress. Among 20 patients receiving 25 mg b.i.d., 1 was completely "cured" (no palpable liver), 10 had complete symptomatic relief but hepatomegaly persisted, 7 had no symptomatic relief, and 2 did not return for adequate follow-up. Among 18 patients receiving 20 mg t.i.d., 15 had complete symptomatic relief (8 of these being "cured" while 7 showed persistent hepatomegal 1 had partial relief, and 2 did not return for adequate follow- Side effects were absent in all but 1 patient who discontinued treatment after 7 days because of nausea and vomiting. Liver function, urine, and hematological tests were normal. Althou oral dehydroemetine dihydrochloride produced improvement i patients with amebiasis, a higher dose was required for hepati amebiasis than for intestinal amebiasis, and improvement was less than that obtained with parenteral dehydroemetine.

3898 ***IN VITRO* INSULIN PRODUCTIVITY OF PRESERVED PANCREAS: A SIMPLE TEST TO ASSESS THE VIABILITY OF PANCREATIC ALLOGRAFTS.** *(E.)* Idezuki, Y. (U. Minnesota Med. Sch., Minneapolis), F. C. Goetz, S. E. Kaufman and R. C. Lillehei. *Surgery* 64(5):940-947, 1968.

The entire pancreas and attached duodenum along with the celiac axis and portal vein were removed from 42 mongrel dogs, immediately washed out with cold heparinized Ringer's solution (4C, pH 7.4), and tested for functional viability after varying periods of preservation. The test procedure involved perfusion with blood-Ringer solution (pH 7.4, hematocrit 22-36%) for 15 min, blood-Ringer-glucose (500 mg%) for 15 min and again blood-Ringer solution for 20 min. Six control grafts were tested for viability immediately after washing out with cold Ringer's solution, and were compared with 36 graft which were perfused and tested after having been preserved fo 6, 12, 24 or 48 hr in Ringer's solution at 2C, either at normal oxygen pressure or at 4 atmospheres absolute. All of the control grafts, 9 of 10 grafts preserved for 6 hr, and 9 of 10 graf preserved for 12 hr released large amounts of insulin in response to glucose stimulation, while 7 of 10 grafts preserved for 24 hr and 1 of 6 grafts preserved for 48 hr released small amounts of insulin. In grafts preserved for 24 hr or less, duodenal contractions, which traversed the full length of the duodenum, occurred within 1 or 2 min after the start of perfusio and little change was noted in histologic studies. In grafts preserved for 48 hr, duodenal contractions were sporadic and localized; the pancreas was swollen, hemorrhagic, and nonviable in appearance, and histologic studies showed hemorrhag into the parenchyma and destruction of acinar tissue. These results indicate that *in vitro* production of insulin may be used to evaluate the viability of the endocrine tissue of preserved pancreatic grafts.

3899 **PRELIMINARY REPORT ON MILLHON-CRITE INTRAESOPHAGEAL MOTILITY PROBE.** *(E.)*

lhon, W. A. (Ohio State U. Coll. Med., Columbus, Ohio),
E. Hoffman, P. Jarvis C. J. Cross, J. S. Millhon and N. A.
tes. *Amer J Dig Dis* 13(10):929-933, 1968.

iew technique for studying esophageal motility, the Millhon-
tes esophageal motility probe, is described. It consists of a
t silicone-rubber tube with 3 miniature direct-recording ab-
ute pressure transducers located in its distal portion. The
st important advantage of this new probe is its ability to
ect absolute localized intraluminal pressures *in situ*, as well
hydrostatic pressures. Other advantages are: 1) lack of arti-
ts with intermittent flush or perfusion; 2) lack of need for
alibration; 3) excellent reproducibility; and 4) radiopaque
nsducers. Encouraging initial results have been obtained
h 35 patients.

00 ENDOSCOPIC DIAGNOSIS OF SLIDING-TYPE DIAPHRAGMATIC HIATAL HERNIAS. *(E.)*
ujillo, N. P. (Walter Reed Gen. Hosp., Washington, D. C.),
L. Slaughter and H. W. Boyce Jr. *Amer J Dig Dis* 13(10):
5-867, 1968.

e accuracy of the different esophagoscopic and gastroscopic
chniques for the diagnosis of hiatal hernia was evaluated in
0 patients. Adequate visualization and localization of the
pression made by the diaphragmatic hiatus on the gut lumen
s attainable with the LoPresti fiber optic esophagoscope, the
ler-Palmer gastroscope and the Hirschowitz Fiberscope. The
curacy in detecting a sliding-type hiatal hernia was as follows:
ler-Hufford esophagoscope, 27%; LoPresti fiber optic eso-
agoscope, 97%; Eder-Palmer gastroscope, 97%; and Hirscho-
tz Fiberscope, 49%. The LoPresti and Eder-Palmer instru-
ents were also felt to be the best for examination of the
ophagogastric junctional area. Air insufflation appears to
d in the visualization of the hernia pouch. It is felt that
nall, endoscopically detectable, sliding-type hiatal hernias may
ay a role in the etiology of obscure pain which cannot be
curately diagnosed by any other method.

901 ALPHA$_1$ FETOGLOBULIN IN THE DIAGNOSIS OF HUMAN HEPATOMA. *(E.)* Alpert, M. E.
Makerere Med. Coll., Kampala, Uganda), J. Uriel and B. De
echaud. *New Eng J Med* 278(18):984-987, 1968.

Ionospecific rabbit antiserum against human alpha$_1$ feto-
lobulin was tested by double-gel diffusion against sera of
atients with hepatoma and other liver diseases and controls
n Uganda. Human fetal alpha$_1$ globulin was found in 50% of
0 patients with primary hepatomas, and in only 2 of 118
atients with other forms of liver disease, including 8 patients
vith metastatic malignant tumors to the liver. The sera of 50
ontrols and 25 relatives of patients with hepatoma was nega-
ive for the human fetal alpha$_1$ globulin.

902 STUDIES IN NEONATAL HEPATITIS AND BILIARY ATRESIA. IV. DIAGNOSIS. *(E.)*
Thaler, M. M. (Harvard Med. Sch., Boston, Mass.) and S. S.
Gellis. *Amer J Dis Child* 116(9):280-284, 1968.

The clinical records, biopsies and autopsies of 144 infants with
neonatal hepatitis and 135 infants with biliary atresia were
examined to evaluate current clinical means of differentiating
between the two. After 4 months of life, bilirubin and alka-
line phosphatase levels in children with neonatal hepatitis declined, while both continued to rise in cases of biliary atresia, permitting differentiation by standard laboratory procedures. Rose bengal excretion averaged 5.5% in 24 cases of biliary atresia, 32.29 ± 4.58% in 23 cases of unoperated neonatal hepatitis, and 9.21 ± 3.65% in operated neonatal hepatitis (liver disease increased 3 times in operated cases). Rose bengal tests should be performed when serum bilirubin is above 4 mg%. This test differentiated between hepatitis and atresia in 80% of the cases of neonatal hepatitis, since obstruction did occur in 1/5 of the cases tested. A percutaneous liver biopsy indicating extensive bile duct proliferation and peritoneal fibrosis combined with little parenchymal disturbance can be interpreted as extrahepatic biliary atresia, while the presence of parenchymal disorganization indicates neonatal hepatitis.

3903 ESTIMATION OF HEPATIC ARTERIAL AND PORTAL VENOUS BLOOD FLOW BY DIRECT CATHETERIZATION OF THE VENA PORTA THROUGH THE UMBILICAL CORD IN MAN. PRELIMINARY RESULTS. *(E.)* Chiandussi, L. (Inst. Med. Path., U. Turin, Italy), F. Greco, G. Sardi, A. Vaccarino, C. M. Ferraris and B. Curti. *Acta Hepatosplen* 15:166-171, 1968.

Fourteen evaluations of an indicator dilution method for the simultaneous determination of hepatic arterial and portal blood flow were performed in 3 patients with normal liver and spleen and 8 well-compensated cirrhotic patients. Two No. 9 Cournand catheters were inserted into one of the main hepatic veins and the left branch of the portal vein through the umbilical cord; a Seldinger catheter was inserted into a femoral artery. The indicator (radioiodinated serum albumin) was injected into the spleen and concentration curves were obtained by sampling blood from the venous catheters. The appearance time of indicator in the arterial blood was calculated by simultaneously sampling blood every 40 sec from the Seldinger catheters. Mean total hepatic blood flow in 3 normal patients was 1550 ml/min with 30.4% contributed by the hepatic artery and 69.6% by the portal vein; in the 8 cirrhotics total blood flow was 1315 ml/min with 39.5% from the hepatic artery and 60.5% from the portal vein. The indicator dilution curves in the left branch of the portal vein showed a rounded peak with no spiking and a steep exponential descent. Hepatic arterial and portal venous flow can be calculated from the ratio between the mean concentration of the indicator in the hepatic veins and the portal vein if the indicator mixes adequately in the portal vein, if no recirculation of the indicator takes place before the indicator dilution curve in the hepatic vein is recorded, and if the total hepatic blood flow (measured using Bradley's technique) is known.

3904 HEPATIC ARTERY AND CELIAC AXIS INFUSION FOR THE TREATMENT OF UPPER ABDOMINAL MALIGNANT LESIONS. *(E.)* Wirtanen, G. W. (U. Wisconsin Med. Sch., Madison), L. C. Bernhardt, S. Mackman, G. Ramirez, A. R. Curreri and F. J. Ansfield. *Ann Surg* 168(1):137-141, 1968.

Hepatic arterial infusions of 5-fluorouracil (30 mg/kg/day x 4, then 15 mg/kg/day x 17) were administered to 109 patients with far-advanced primary or metastatic malignant disease of the liver, and celiac axis infusions were given to patients with carcinomas of the head of the pancreas. A total of 152 courses were given (43 patients receiving more than 1 course). Of 136 percutaneous approaches, 111 were transbrachial with the cracking, leakage or displacement during infusion. Approximately 60% of the patients with advanced hepatic involvement had remissions after intraarterial infusion of 5-fluorouracil.

3905 USE OF 'FLAGYL'/NIVEMBIN IN POST-DYSENTERIC STATES. *(E.)* Sardesai, H. V. (Sassoon Gen. Hosp., Poona, India) and S. R. Patil. *Antiseptic* 65(6):431-434, 1968.

Fifty-six patients (41 males and 15 females, 16-60 yr old) with amebic dysentery (cysts of *E. histolytica* in the stools) were treated with the amebicidal drug Nivembin (3 tablets/day for 7 days); 28 received Nivembin alone and 28 received Nivembin + Flagyl (same dosage) in order to control secondary infestation by flagellates. In the Nivembin group, diarrhea and abdominal pain were the only symptoms relieved, while the Nivembin + Flagyl group reported additional relief of the sense of incomplete evacuation, constipation, and abdominal gas. In addition to the conditioned reflex of repeated bowel evacuation, alterations in the bacterial flora, and secondary bacillary infections, flagellates (*Giardia, Blastocyst*) may be a common complication of amebic dysentery.

3906 OFFICE DIAGNOSIS OF ANO-RECTAL COMPLAINTS. *(E.)* Staehle, G. E. (S. Orange, N. J.). *J Med Soc New Jersey* 65(8):451-454, 1968.

A survey of approximately 50,000 private cases is presented to clarify the office diagnosis of ano-rectal complaints. The patient having internal hemorrhoids presents with 2 prime symptoms: bleeding (bright red) and/or protrusion (prolapse of exceedingly redundant mucosa above the ano-rectal line). In anal fissure or ulcer, the symptoms are painful, burning, throbbing pressure (from sphincter spasm) and usually bleeding. Diagnosis should be made by inspection, not by digital examination. The symptoms of anal hematoma are a steady protruding of the skin covering the perianal veins, with pain and discomfort and no bleeding; its diagnosis can be made by history alone prior to examination which will reveal a bluish swelling covered with skin, (not mucous membrane) and extremely sensitive to pressure. Patients with fistula in ano (the acute stage is abscess formation) present with fever and complaints of severe aching and pressure pain. The complete chronic fistula is easily diagnosed by the external opening through which a Bowman probe can be directed to the internal opening (infected crypt); a "blind" chronic fistula is a greatly enlarged infected crypt and can be easily palpated. Anal prolapse is similar to hemorrhoids but there is no bleeding and the greatly redundant mucosa does not have the injected or varicose appearance of hemorrhoids. Brief diagnostic criteria are also presented for anal papilloma, papillitis, cryptitis, hidradenitis suppurativa, foreign bodies and carcinoma. The left Sims position is suggested for examination of patients.

3907 THE GASTROCAMERA IN THE DIAGNOSIS OF STOMACH DISEASE. *(E.)* Carandang, N. (Henry Ford Hosp., Detroit, Mich.), B. M. Schuman and R. J. Priest. *JAMA* 204(8):717-722, 1968.

A study was made of the use of the gastrocamera in the examination of 300 patients with various stomach disorders (117 were 60 yr of age or older). The camera (contained in a 3-cm

catheter tip placed in the hepatic artery in 96 patients, in the celiac axis in 13, and in the gastroduodenal artery in 2. The transfemoral approach was used in 25 patients for celiac axis infusion. Drug administration was reduced or stopped when reactions such as gastritis, leukopenia, or diarrhea occurred, but was reinstituted when these conditions abated. Of 40 patients with extensive hepatic metastases of colorectal origin, 28 were improved as were 6 of 8 patients with metastases of mammary origin. Arterial infusions were given either because conventional administration failed or because the lesion was too far advanced to be treated conventionally without undue hazard. Responses in inpatients and outpatients were about the same. In 37 instances it was necessary to terminate infusion earlier but in most cases not before 3 weeks, due primarily to catheter

metal tip with a tungsten filament lamp and an 80° wide-angle lens with a 3.6 mm focal length) is connected to an external control box by a hollow 75-cm tube, 8.5 mm in diameter. Premedication for the patient consists of 50-75 mg meperidine hydrochloride and 0.4-0.6 mg atropine sulfate i.m. 45 min prior to intubation. Two ml of simethicone in 10 ml water is given before swabbing the throat with 5% hexylcaine hydrochloride. After introduction of the camera, the stomach is slowly inflated to tolerance with 400-600 ml of air. Forty-six ulcers and 8 cancers of the stomach were photographed. Only 1/3 of roentgenographically diagnosed antral ulcers were photographed, but 11 gastric ulcers not noted by the radiologist were found. Lesions at the cardia or in the fundus, suspected on X-ray study, were more clearly defined by a complimentary gastrocamera examination. Pictures of an ulcer were often decisive in establishing the presence of a malignancy. Gastritis was the most frequent abnormality discovered in the group with normal findings from X-rays of the upper gastrointestinal tract. The technique is reported to be well tolerated, very safe, and can be performed in a few minutes. The photographs (tungsten type ASA 32 film) were of excellent quality and provide a permanent record for consultation with colleagues and for teaching of gastric pathology. The only disadvantage noted is the delay in processing of the film.

3908 METHAEMALBUMINAEMIA IN ACUTE ABDOMINAL EMERGENCIES. *(E.)* Bank, S. (Grote Schuur Hosp., Observatory, Cape, South Africa), I. N. Marks and W. Silber. *Brit Med J* 2(5597):86-87, 1968.

Five case reports of patients with methemalbuminemia (2 had pancreatitis, 2 had infarction of the small bowel, and one had an intrahepatic hematoma) are presented. The presence of methemalbumin may have been the result of the enzymatic destruction of hemoglobin with the absorption of hematin. The absorption of heme rather than hemoglobin into the plasma in the 2 cases of hemorrhagic infarction of the bowel and the one patient with intrahepatic hematoma could also account for the methemalbuminemia due to the digestion of the extravasated blood by proteolytic enzymes in the liver and the mucosa of the small bowel. It is stressed that the presence of methemalbumin in the blood should not be regarded as a diagnostic sign of pancreatitis but only as a possible means of differentiating the hemorrhagic from the edematous variety. It is suggested that laparotomy may be advisable in establishing a firm diagnosis in patients with acute abdominal emergencies associated with methemalbuminemia.

DIAGNOSTIC PROCEDURES AND GENERAL THERAPY

909 METHEMALBUMIN IN THE DIAGNOSIS OF ACUTE PANCREATITIS. *(E.)* Joseph, W. L. UCLA Sch. Med., Los Angeles, Calif.), G. H. Stevens and W. P. ongmire Jr. *J Surg Res* 8(5):206-210, 1968.

The diagnostic value of methemalbumin (the product of hemoglobin digestion by pancreatic enzymes) in acute pancreatitis was studied in 40 mongrel dogs of both sexes. Ten dogs were used as controls; in another 10 dogs acute pancreatitis was produced by the method of Elliot (10 cc of bile mixed with commercial trypsin was injected into the cannulated main pancreatic duct under a pressure greater than 40 cm of water). In the 20 remaining dogs various lesions were produced to simulate surgical conditions associated with increased amylase levels (perforated ulcer in 5 dogs, jejunal occlusion in 5 dogs, occlusion of the superior mesenteric veins in 5 dogs, acute peritonitis in 5 dogs). In the 10 dogs with acute pancreatitis serum amylase levels varied between 1000 and 2000 Somogyi units for 12 to 36 hr postoperatively, and then returned to preoperative levels. Methemalbumin levels rose to 59-159 mg% 18 hr postoperatively and remained there for 3 days before returning to normal. In the 20 dogs with various surgically-induced disorders, blood amylase behaved as in the pancreatic dogs but the methemalbumin levels remained below 8.02 mg% in all instances. It is concluded that methemalbumin represents a good index for the diagnosis of pancreatitis when the serum amylase level has returned to normal.

3910 ABDOMINAL PARACENTESIS WITH A DIALYSIS CATHETER AND PERITONEAL LAVAGE–A DIAGNOSTIC TEST IN ACUTE ABDOMINAL CONDITIONS. *(E.)* Gjessing, J. (Sundsvall Hosp., Sweden) and H. Dencker. *Acta Chir Scand* 134(5):351-352, 1968.

Abdominal paracentesis with a peritoneal dialysis catheter was tried in 10 patients as a diagnostic test in acute abdominal conditions. Bottles containing the dialysis fluid were heated to body temperature and 30 ml/kg were instilled into the peritoneal cavity. Dextrose (15.0 g/liter of dialysate) increased the osmolarity of the fluid and made it hypertonic to the plasma (6-8 g/liter of the dextrose was absorbed). Positive findings occurred in 9 patients as follows: pancreatitis (3), ruptured spleen (2), ruptured liver, perforated ulcer, ruptured gallbladder, and ruptured pancreas. The pancreatitic patients were not subjected to laparotomy (peritoneal dialysis only), but laparotomy confirmed the diagnosis in the other 6 patients. For abdominal paracentesis, an ordinary dialysis catheter is easy to direct into different parts of the abdominal cavity, especially into the lowest part (the pouch of Douglas) where fluid most commonly collects first. Washing out the abdominal cavity gives a better specimen for examination. A negative result from paracentesis, however, does not rule out the possibility of intra-abdominal injury.

3911 ROENTGEN EXAMINATION OF STRICTURE OF THE LOWER OESOPHAGUS. *(E.)* Mortennson, W. (U. Hosp., Lund, Sweden) and S. Sandmark. *Acta Radiol [Diagn]* 7(4):355-360, 1968.

Case reports are presented for 4 patients (2 men and 2 women, 55-74 yr old) who were shown by X-ray examination to have a lower esophageal stricture (approximately 5 cm in length) diagnosed as due to carcinoma of the esophagus. Subsequent X-ray examination with light barium contrast medium and with abdominal compression showed the original diagnosis to be in error. No malignancy was present, nor were the strictures as long as previously shown (only 1 cm long). The disorder was diagnosed as hiatus hernia in all cases with inflammatory lesions in 2. The barium medium employed is not transmitted rapidly by peristalsis, which allows more time for examination of the morphological features of the esophagus; it also gives better filling below the stricture and a clearer demonstration of a hernia. Abdominal compression is necessary for complete and effective examination.

3912 A PHYSICAL CHEMICAL STUDY OF THE VAN DE KAMER METHOD FOR FECAL FAT ANALYSIS. *(E.)* Braddock, L. I. (U. Pennsylvania Sch. Med., Philadelphia), D. R. Fleisher and G. J. Barbero. *Gastroenterology* 55(2):165-172, 1968.

Physicochemical investigations demonstrated that the van de Kamer technique is suitable for fecal fat assays and for assay of a wide molecular-weight range of fatty acids, provided the saponification is conducted with a maximal alcohol content. Modification of the van de Kamer procedure by distillation of the alcohol from the saponification mixture prior to extraction resulted in virtually complete recovery of the fatty acids from both medium-chain-triglyceride oil and corn oil with an improvement in precision. This modification eliminated the two sources of error which appeared to predominate in the van de Kamer technique with medium-chain triglycerides: an inefficient distribution ratio with the van de Kamer solvent system and an unfavorable interaction between oil hydrolysate and the fecal particles.

3913 EFFECT OF INTRAGASTRIC GLUCOSE-ELECTROLYTE INFUSION UPON WATER AND ELECTROLYTE BALANCE IN ASIATIC CHOLERA. *(E.)* Pierce, N. F. (Johns Hopkins U. Ctr. Med. Res. Training, Calcutta, India), J. G. Banwell, R. C. Mitra, G. J. Caranasos, R. I. Keimowitz, A. Mondal and P. M. Manji. *Gastroenterology* 55(3):333-343, 1968.

Fourteen adult male patients with severe "rice water" diarrhea and bacteriologically proven cholera, who passed 367-792 ml of stool per hr during the first 7-18 hr after admission, were found to have intact glucose absorption and a definite improvement in net water and electrolyte balance during a 12-hr intragastric infusion of any 1 of 3 solutions containing sodium (101, 110, 118 mEq/liter), potassium (8.5, 9.0 mEq/liter), chloride (74.5, 79.0, 86.5 mEq/liter), bicarbonate (35, 40 mEq/liter), and glucose (40, 160, 220 mM/liter), with osmolalities of 274, 380, and 421 milliosmoles per liter. Only 2 patients had detectable fecal glucose, indicating that glucose absorption in cholera patients is an active process. Stool electrolyte values before and after infusion show that intestinal sodium and water absorption mechanisms remain intact, and it is unlikely that cholera stool forms because of their failure. When the glucose concentration was raised from 40 to 160 mM/liter and the osmolality raised from 274 to 380 milliosmoles/liter, the infusion rate required to maintain balance with stool losses was cut in half; further increases in the same parameters failed to reduce maintenance requirements. Intragastric infusion satisfactorily maintains water, electrolyte and acid-base balance for the 12-

hr infusion period. The data indicate that intragastric fluid infusion may play a significant role in water and electrolyte replacement in cholera patients.

3914 IMMUNOGLOBULINS IN THE COURSE OF VIRAL HEPATITIS AND IN CHOLESTATIC AND OBSTRUCTIVE JAUNDICE. *(E.)* Wollheim, F. A. (Malmo Gen. Hosp., Sweden). *Acta Med Scand* 183(5):473-479, 1968.

Immunoglobulins G, A and M were determined during the course of the disease in 19 cases of sporadic infectious hepatitis, 8 cases of epidemic infectious hepatitis, 11 cases of serum hepatitis, 5 cases of cholestatic jaundice, and 15 cases of obstructive jaundice. Immunoglobulin levels were determined by immunodiffusion in Oudin tubes with specific antisera; bilirubin, thymol turbidity, SGPT, alkaline phosphatases, and γ-glutamyltranspeptidase levels were also determined. A marked increase in γM was found initially in both infectious hepatitis groups (367% ± 160 and 376% ± 145), but the levels fell precipitously during the first weeks of illness. Significantly lower γM levels were found in the serum hepatitis group (210% ± 82) and 5 of the cases showed normal immunoglobulin levels. Levels of γG rose to a lesser extent (158% ± 54 and 142% ± 36) in the infectious hepatitis patients but tended to remain elevated longer. There was no significant difference in γG response between infectious hepatitis and serum hepatitis (131% ± 37). Small significant increases in γA levels were observed in infectious hepatitis. Slight or no changes occurred in γD levels in 3 cases of infectious hepatitis and 2 cases of serum hepatitis. No alterations of immunoglobulin levels were observed in cholestatic or obstructive jaundice, indicating that liver damage per se does not give rise to the changes observed in viral hepatitis. A close correlation was observed between thymol turbidity and γM.

3915 QUANTITATION OF GASTROINTESTINAL PROTEIN LOSS BY MEANS OF ^{59}Fe-LABELLED IRON DEXTRAN. *(E.)* Jarnum, S. (State Hosp., Copenhagen, Denmark), H. Westergaard, M. Yssing and H. Jensen. *Gastroenterology* 55(2):229-241, 1968.

To determine whether a correlation exists between the increased total catabolism in protein-losing enteropathy and fecal clearance of ^{59}Fe-labelled iron dextran, 35 control subjects with diseases having no effect on serum protein turnover and 37 gastroenteropathy patients were studied. Sixteen control subjects were studied using radioiodine-labelled albumin (0.1-0.3 μC/kg, i.v.; 12 controls and 12 patients using ^{51}Cr-albumin or ^{51}CrCl$_3$ (20-30 μC, i.v.), 7 controls and 21 patients using ^{59}Fe-iron dextran (0.1-0.2 μC/kg, i.v.), and 4 patients using both ^{51}Cr and ^{59}Fe. The data of 11 patients previously diagnosed using ^{131}I-labelled polyvinylpyrrolidone (^{131}I-PVP) were used for comparison. Fecal, urinary, plasma, and whole body radioactivity were monitored at intervals throughout the experiment, and potassium iodide (40 mg/day) was given orally to prevent ^{131}I uptake by the thyroid. No statistically significant correlation between fecal ^{131}I output following ^{131}I-PVP and serum albumin or fractional catabolism of ^{131}I-albumin was found, although a fair correlation existed between both fecal ^{51}Cr-albumin (or ^{51}CrCl$_3$) and ^{59}Fe-dextran excretion and the fractional ^{131}I-albumin catabolic rate. A highly significant correlation exists between fractional ^{131}I-albumin catabolism and both fecal ^{59}Fe and ^{51}Cr clearance. It is concluded that ^{59}Fe-iron dextran permits a more reliable quantitation of gastrointestinal protein loss than ^{131}I-PVP and ^{51}Cr-albumin or ^{51}CrCl$_3$. It is more valuable in assessing gastroenteropathy treatment whose purpose is reducing protein loss. It is of particular interest in pediatric studies because no urinary ^{59}Fe excretion takes place.

3916 VALUE OF EXFOLIATIVE CYTOLOGY IN PANCREATIC CARCINOMA. *(E.)* Goldstein, H. (U.C.L.A. Sch. Med., Los Angeles, Calif.) and L. E. Ventzke *Gut* 9(3):316-318, 1968.

Sixty-seven patients were chosen for exfoliative cytological examination of the duodenal contents after secretin stimulation because of a clinical suspicion of pancreatic carcinoma. Of the 49 who showed no malignant cells on cytological examination, 43 were later proven not to have the disease. These were later found to be suffering from pancreatitis (15 cases), choledocholithiasis (6 cases), nonpancreatic malignancy (5 cases), cirrhosis (4 cases), intrahepatic cholestasis (3 cases); or other conditions. In the group of 24 patients who had carcinoma of the pancreas as confirmed by necropsy, malignant cells were obtained by cytological examination in 18. There were no fals positivies. It was noted that while none of the patients with carcinoma of the pancreas were cured of the disease, the finding of malignant cells on cytological examination provided a definite diagnosis in those patients in whom there was no po possibility of a palliative operation nor hope of a curative procedure. Such patients could thus be spared a major operation for solely diagnostic purposes.

3917 NIRIDAZOLE IN AMEBIC DYSENTERY AND HEPATIC AMEBIASIS. *(E.)* Doshi, J. C. (K. E. M. Hosp., Parel, Bombay, India), M. J. Doshi, A. B. Vaidya, J. M. Mehta and U. K. Sheth. *Amer J Trop Med* 17(5):702-708, 1968.

Niridazole (500 mg 2-3 times a day p.o.) was used in the treatment of 32 male patients (18-55 yr old) with amebiasis. In the 27 cases of amebic dysentery, 77.7% were completely cured clinically and parasitologically, with healing of ulcers. In the 11 patients with hepatic amebiasis there was a 72.7% cure rate. Side effects included nausea, vomiting, abdominal colic, headache, giddiness, fall in blood pressure, flushing, sweating and generalized weakness. However, these adverse reactions were generally mild and transient and thus did not necessitate discontinuation of the drug. Electrocardiographic changes, especially flattening of the T wave, were observed in 53.1% of the cases. In 8 patients on whom follow-up studies could be done, a normal ECG pattern returned within 2-4 weeks after the end of treatment. Confusional psychosis was observed in two patients. Although one patient died during the course of treatment, the cause of death could not be ascertained.

3918 THE ROLE OF BIOASSAY IN THE DIAGNOSIS OF ULCEROGENIC TUMORS. *(E.)* Wilson, S. D. (Marquette Sch. Med., Milwaukee, Wis.), J. A. Mathison, W. J. Schulte and E. H. Ellison. *Arch Surg* 97(3):437-443, 1968.

Adult Sprague-Dawley rats were used for the bioassay of a gastric secretagogue in the serum of 25 patients with proven, ulcerogenic, pancreatic, non-beta islet-cell tumors, 21 control patients, and 22 patients with proven peptic ulcer disease but no pancreatic tumors. An arbitrary standard of a 100% increase in acid output from basal levels was called a positive test. Each serum was tested in at least 2 different rats. The studies indicated the presence of a potent gastric secretagogue in 10 of the 25 patients with ulcerogenic tumors, while all sera from the 21 control patients and the 22 patients with peptic ulcer disease were negative for gastric secretagogue activity. Although positive results occurred only with sera from Zollinger-Ellison patients, a negative bioassay did not rule out the presence of an ulcerogenic tumor. A wide range of gastrin levels in patients with non-beta islet-cell pancreatic tumors is suggested.

3919 HAVENS' HEMAGGLUTINATION TEST IN INFECTIVE HEPATITIS. *(E.)* Arora, B. (Dept. Med., U. Bristol, England) and A. E. Read. *Gut* 9(3):284-286, 1968.

The hemagglutination test was performed by the method of Havens on 533 sera from patients during an epidemic of viral hepatitis. All patients were jaundiced during the attack, and the test was repeated in 203 of these cases. Of the 533 sera tested, 143 (26.9%) were positive. These positive results were obtained in 49.3% of sera obtained from patients within the first 4 weeks of the attack; in 25.6% of those obtained 2-6 months after onset, and in 17.2% of sera obtained during the next 6 months. Positive results were also found in 25% of the sera which were obtained 1-2 yr after the onset of the disease. It is noted that the test may remain positive without any apparent persistent liver disease, and does not differentiate infectious hepatitis from other types of hepatocellular jaundice.

3920 THE EXTENT OF SIGMOIDOSCOPY SHOWN ON RADIOGRAPHS WITH SPECIAL REFERENCE TO THE RECTOSIGMOID JUNCTION. *(E.)* Madigan, M. R. (St. Mark's Hosp., London, England) and J. M. Halls. *Gut* 9(3):355-362, 1968.

Sixty-two patients were examined by a double-contrast enema technique to investigate: what parts of the rectum and pelvic colon are seen during sigmoidoscopy; the reason for the occasional inability to pass the instrument its full length; and areas where special care is required in looking for lesions. Full insertion failed in 58% of the cases and was found to be due to an acute flexure in the rectosigmoid area. When this was present, neither altering the position of the patient nor general anesthesia helped in passing the sigmoidoscope beyond the acute bend. It was found that stretching of the rectum may give the false impression that the tip of the instrument lies within the colon, when an impassable flexure is less than 25 cm from the anal margin. It was also noted that a double-contrast enema is necessary for investigation of those areas proximal to an impassable flexure, and that it is possible to predict from the radiographs whether a lesion is within reach of the sigmoidoscope.

3921 CLINICAL EXPERIENCE WITH GASTROSCOPY. *(E.)* Phelan, J. T. (Roswell Park Mem. Inst., Buffalo, N. Y.). *New York J Med* 68(16):2161-2163, 1968.

In 8 of 38 patients referred for gastroscopic examination, gastroscopy gave negative results or was unsuccessful while the X-ray and surgical findings were positive for disease. In 2 others with negative X-ray findings, however, gastroscopy revealed a recurrent reticulum cell sarcoma and gastritis, resp., while in 6 cases with positive X-ray findings gastroscopy proved more accurate in determining the correct diagnosis. Gastroscopy was found to be most useful in augmenting inconclusive X-ray findings (15 cases). In most of these cases, the roentgenograms showed bizarre or atypical changes which required further clarification by gastroscopy. In some instances, the gastroscopic examination was useful in determining the operability of a given lesion. Gastroscopy is concluded to be a highly useful tool when looked upon as one phase in the overall approach to patients with a clinically suspected gastric malignancy.

3922 INTEGRAL DOSE IN 35-MM CINEFLUOROGRAPHY OF THE GASTROINTESTINAL TRACT. *(E.)* Kaude, J. (X-ray Diagn. Dept., Lund U. Hosp., Sweden). *Acta Radiol* 7(2):170-176, 1968.

Although cinefluorography combines the ability to study motility and morphological features with sufficient sensitivity to detect even small lesions, of the gastrointestinal tract, the added radiation burden of the cinefluorographic technique must be evaluated before the technique is used routinely. The author reviews the literature on the integral doses involved in full-size radiography and cinefluorography, and reports a study in which the integral doses in 35-mm cinefluorography and full-size radiography of the gastroduodenal tract were measured in 90 patients. The mean integral dose for cinefluorography at a film speed of 12 frames/sec was 14.9 kg rad per examination; the average duration of a stomach examination was 1.5 min; and the mean integral dose rate was 10 kg/rad/min. The mean integral dose for full-size radiography was 3.7 kg rad for 7-11 films. The integral dose for cinefluorography was therefore 4 times the integral dose for full-size radiography.

3923 EXAMINATION OF THORACIC DUCT LYMPH FOR TUBERCLE BACILLI AS A DIAGNOSTIC AID IN PATIENTS WITH TUBERCULOSIS OF THE GASTROINTESTINAL TRACT. *(E.)* Vaidya, M. P. (Coll. Med. Sci., Benares Hindu U., Varanasi, India), Shriniwas and H. N. Singh. *Indian J Surg* 30(1):8-15, 1968.

Lymph collected by cannulation of the thoracic duct (200-700 cc/patient) from 20 patients with suspected gastrointestinal tuberculosis was examined for tubercle bacilli by direct microscopic examination, *in vitro* culture, and s.c. inoculation into guinea pigs. A brief discussion of the surgical anatomy of the thoracic duct and the cannulation technique is included. Tubercle bacilli were demonstrated in the thoracic duct lymph in 3 of 15 patients with confirmed tuberculosis; all 3 cases were revealed by guinea pig inoculation, and one was also revealed by *in vitro* culture of the sample. No tubercle bacilli were found in the lymph of 5 nontubercular patients, including 2 with chronic appendicitis, 1 each with pyogenic peritonitis and retroperitoneal lymphosarcoma, and a woman with an intestinal reticulum cell sarcoma who had the typical symptoms of gastrointestinal tuberculosis. The results indicate that a definite diagnosis can only be made on the basis of either a typical histopathology and/or the presence of tubercle bacilli within the lesion. These bacilli are carried from the gastrointestinal tract through the lymphatic channels and thoracic duct and are then disseminated throughout the body.

3924 RADIOISOTOPE SCANNING IN EXPERIMENTAL AND CLINICAL ORTHOTOPIC LIVER TRANSPLANTATION. *(E.)* Groth, C. G. (U. Colorado Sch. Med., Denver), D. W. Brown, J. D. Cleaveland, D. J. Cordes, L. Brettschneider and T. E. Starzl. *Surg Gynec Obstet* 127(4): 808-816, 1968.

Serial scans using 800 μC technetium-99M sulfide i.v./scan were done pre- and postoperatively in 3 normal dogs given sham operations; 2 dogs with common bile ligations; 3 dogs with hepatic artery ligations; 3 dogs with Eck fistulas; and 12 dogs with orthotopic hepatic homografts, 7 of which received immunosuppressive therapy; and postoperatively in 6 infants (14-24 months old) who had received cadaveric orthotopic liver homografts 2-17 days before because of hepatoma (1 case) or extrahepatic biliary atresia (5 cases). Although liver scans remained normal, despite biliary cirrhosis and increased serum transaminases, following ligation of the common bile duct or hepatic artery, Eck fistulas resulted in hepatic atrophy and areas of diminished radioisotope uptake, liver homografts in the process of rejection showed a progressive decrease in homogeneity and degree of radioisotope uptake. One of the 6 infants showed a necrotic right hepatic lobe due to a thrombotic hepatic artery in the initial scan. Three of the others developed large filling defects within 25-52 days, accompanied by high fever, gram-negative septicemia, and increases in SGPT and SGOT; all died within 1 week. One of the other 2 developed a severe and protracted rejection one week after transplantation, with swelling of the homograft. Three or more months after transplantation, both infants showed a progressive shrinkage of the homografts with jaundice and decreased uptake of radioisotope. One patient died after 4.5 months while the other patient, although still alive 6 months postoperatively, had poor liver function. Crucial and incisive information concerning organ size and function can be obtained with serial liver scans after orthotopic hepatic transplantation. The technique is valuable in the diagnosis and localization of hepatic infarcts and for following the course of hepatic regeneration or homograft rejection.

3925 SEROLOGICAL DIAGNOSIS OF AMOEBIASIS BY IMMUNOFLUORESCENCE. *(E.)* Boonpucknavig, S. (Dept. Path., Monash U., Melbourne, Australia) and R. C. Nairn. *J.Clin Path* 20(6):875-878, 1967.

Serum antibody titration was used in a number of cases of human amebiasis and in unaffected controls to provide the basis for a simple, standardized, immunofluorescence test for the diagnosis of this disease. A titer of 16 was taken as diagnostic since at this level there were no false positives among 94 control sera. Using this basis, a positive serological diagnosis was made in 66 of 78 established cases. The test was simple to perform and could be carried out on amebic smears which were stored for several months in octanol. The serological activity was found to be largely confined to the IgG immunoglobulin fraction, specific for *Entamoeba histolytica*, and did not cross-react with other protozoa. The use of a gel diffusion technique produced a positive diagnosis in 60 of the 78 cases.

3926 TRANSHEPATIC CHOLANGIOGRAPHY. *(Fl.)* Van Maercke, Y. (St. Joseph's Clin., Antwerp, Belgium). *T Gastroent* 11(2):140-159, 1968.

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3928 THE USE OF MODERN ANTIHELMINTHIC AGENTS IN THE TREATMENT OF PARASITIC INTESTINAL DISEASES. *(Ger.)* Mohr, W. (Hamburg, Germany). *Arztl Praxis* 20(39):1837, 1968.

3929 BILIRUBIN-LIKE MATERIAL IN URINE OF NORMAL ADULTS. *(E.)* Fevery, J. (St. Rafael Acad. Hosp., Louvain, Belgium), F. H. Jansen, J. A. T. P. Meuwissen and K. P. M. Heirwegh. *Clin Chim Acta* 21(3):401-410, 1968.

3930 PASSAGE OF HUMAN BENCE JONES PROTEIN INTO THE INTESTINAL LUMEN; AN ISOTOPIC AND IMMUNOCHEMICAL STUDY IN THE RAT. *(E.)* D'Addabbo, A. (Dept. Int. Med., U. Bari, Italy), F. Dammacco, F. P. Schena and G. Dalfino. *Clin Chim Acta* 21(3):437-444, 1968.

3931 A DEVICE FOR DOUBLE-CONTRAST EXAMINATION OF THE COLON WITHOUT ASSISTANCE. *(E.)* Leszczynski, S. (2nd Cent. Clin. Hosp., Mil. Med. Acad., Warsaw, Poland) and J. Tubielewicz. *Pol Rev Radiol Nucl Med* 31(5):721-724, 1967.

3932 THE SIDE EFFECTS OF MODERN DRUGS FOR INTESTINAL TRACT PARASITES. *(Pol.)* Bojanowicz, K. (1st Int. Med. Clin., Acad. Med., Lodz, Poland) and R. Pietrowa. *Wiad Parazyt* 14(3):303-311, 1968.

3933 A NEW AUTOMATED DETERMINATION OF XANTHURENIC ACID IN HUMAN URINE. *(E.)* Looye, A. (U. Hosp.,Groningen, Netherlands), E. W. Kwarts and A. Groen. *Clin Chem* 14(9):890-897, 1968.

3934 IONIC ACTIVITIES OF SODIUM, POTASSIUM, AND CHLORIDE IN HUMAN SERUM. *(E.)* Dahms, H. (Yale U. Sch. Med., New Haven, Conn.), R. Rock and D. Seligson. *Clin Chem* 14(9):859-870, 1968.

3935 INTEGRAL DOSE IN 70-MM FLUOROGRAPHY OF THE GASTRODUODENAL TRACT. *(E.)* Carlsson, C. (Lund U. Hosp., Sweden) and J. Kaude. *Acta Radiol* 7(1):84-88, 1968.

3936 SPLENOPORTOGRAPHY. *(E.)* Baron, M. G. (Mount Sinai Hosp., New York City) and B. S. Wolf. *JAMA* 206(3):629-634, 1968.

3937 COLONIC AIR INSUFFLATION IN ABDOMINAL DIAGNOSIS. *(E.)* Kirk, R. M. (Hampstead Gen. Hosp., England) and T. Sussman. *Brit J Clin Pract* 22(7): 281-283, 1968.

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3944 **THE DIAGNOSTIC SIGNIFICANCE OF ABDOMINAL PAIN.** *(Ger.)* Bircher, J. (Med. U., Zurich, Switzerland). *Schweiz Med Wschr* 98(28):1029-1031, 1968.

3945 **NECESSARY AND SUPERFLUOUS PROCEDURES IN GASTRIC DIAGNOSIS.** *(Ger.)* Haemmerli, U. P. (Med. Clin., U. Zurich, Switzerland), J. Bircher, R. Gassmann, H. J. Keel, M. L. Hefti, E. Hafter, K. Huber and M. S. Meier. *Schweiz Med Wschr* 98(28):1032-1035, 1968.

3946 **A COMPARATIVE STUDY OF SEA-SALT WATER AND CARY-BLAIR MEDIA FOR TRANSPORTATION OF STOOL SPECIMENS.** *(E.)* Zafari, Y. (Ref. Lab., Tehran, Iran), A. Zarifi and F. Zomorodi. *J Trop Med Hyg* 71(7):178-179, 1968.

3947 **THE RADIOLOGICAL DIAGNOSIS OF ACUTE PANCREATITIS.** *(Hun.)* Erdelyi, M. (Inst. Postgrad. Med., Budapest, Hungary). *Magyar Sebeszet* 21(4):235-241, 1968.

3948 **TREATMENT OF TAPEWORM INFESTATION IN CHILDREN WITH RADEVERM.** *(Ger.)* Kirmse, H. (Erlabrunn Miners' Hosp., Germany). *Deutsch Gesundh* 23(30):1399-1401, 1968.

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4020 **A COMPARATIVE STUDY OF THE TRANSAMINASES AND OTHER ELEMENTS OF THE HEPATOGRAM, ESPECIALLY THE SEROCOLLOIDAL LABILITY TESTS, IN DISEASES OF THE LIVER.** *(Rev.)(Sp.* Meeroff, M. ("Prof. Dr. Gregorio Araoz Alfaro" Polyclin., Buenos Aires, Argentina), A. R. Folino, O. N. Pelizzari, B. Feldfeber and R. Celestino. *Medicina (Mexico)* 48(1031): 101-112, 1968.

4021 **ANTIBODIES AND IMMUNOGLOBULINS IN LIVER DISEASE.** *(Rev.)(E.)* Walker, G. and D. Doniach. *Gut* 9(3):266-269, 1968.

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22 **NONMETASTATIC HYPERNEPHROMA WITH REVERSIBLE HEPATIC DYSFUNCTION.** *(E.)* alsh, P. N. (Washington U. Sch. Med., St. Louis, Mo.) and M. Kissane. *Arch Intern Med* 122:214-222, 1968.

x patients with nonmetastatic hypernephroma and various
ombinations of hepatomegaly, splenomegaly, and hepatic dys-
nction are reported. Typical manifestations included con-
itutional symptoms, fever, weight loss, anemia, thrombocy-
osis, monocytosis, and hepatosplenomegaly. Liver function
ests showed abnormal sulfobromophthalein retention, marked
levation of alkaline phosphatase activity, hypoalbuminemia,
yperglobulinemia, hypocholesterolemia, and prolonged pro-
hrombin time. Hepatic dysfunction and hepatosplenomegaly
egressed after surgical removal of the renal cell tumor in 4
atients. The diagnosis of renal cell carcinoma was made at
utopsy in 2 patients. It is suggested that hepatosplenomegaly
nd hepatic dysfunction may occur as manifestations of hyper-
ephroma without metastases, with regression of the abnormal-
ties after nephrectomy.

023 **STUDIES ON INFANT DIARRHEA. III. CHANGES IN COMPOSITION OF SALINE AND GLUCOSE-SALINE SOLUTIONS INSTILLED INTO THE COLON.** *(E.)* Torres-Pinedo, R. (Porto Rico U. Hosp., San Juan), E. Conde, G. Robillard and M. Maldonado. *Pediatrics* 42(2):303-311, 1968.

Samples of saline and glucose-saline solutions instilled into the distal colon of 18 infants with acute infectious diarrhea were collected at hourly intervals. Differences in the composition of the hourly samples were observed with the 2 solutions. In all instances, a decrease in the concentration of sodium and chloride, and an increase in the concentration of potassium, bicarbonate, and organic acids was noted. Organic acid concentrations increased to much higher values with the glucose-saline solution than with the saline solution. Bicarbonate concentration was always very low in the presence of glucose. The net effects induced by glucose were generation of organic acids with subsequent formation of poorly absorbable organic acid salts, and osmotic inflow of water. This results in a net gain of hydrogen ions by the body fluids, a decrease in sodium absorption, augmented potassium loss, and an increase in colonic fluid volume.

4024 **MORPHOLOGICAL AND ABSORPTION STUDIES OF SMALL INTESTINE IN HOOKWORM DISEASE (ANCYLOSTOMIASIS) IN WEST PAKISTAN.** *(E.)* Aziz, M. A. (U. Maryland, Sch. Med., Baltimore) and A. R. Siddiqui. *Gastroenterology* 55(2):242-250, 1968.

Thirty patients with clinically overt hookworm infection and anemia were investigated for intestinal malabsorption; 23 of the 30 patients had follow-up examinations after specific treatment and clinical improvement. No significant correlation between hookworm disease and intestinal malabsorption was found. Morphological abnormalities seen in biopsies of intestinal mucosa were variable with no significant alteration after clinical improvement, 4 to 6 weeks after the initial biopsy. It was concluded that the observed intestinal mucosal abnormalities were unrelated to hookworm infection.

4025 **ASCORBIC-ACID LEVELS IN LEUCOCYTES OF PATIENTS WITH GASTROINTESTINAL HEMORRHAGE.** *(E.)* Russell, R. I. (Gardiner Inst., Western Infirmary, Glasgow, Scotland), J. M. Williamson, A. Goldberg and E. Wares. *Lancet* 2(7568):603-606, 1968.

Leucocyte-ascorbic-acid (LAA) levels were measured in 60 patients with gastrointestinal bleeding and compared with LAA levels in a matched peptic-ulcer control group and in a healthy control group. The mean value of 14.2 μg per 10^8 WBC was significantly lower than the mean values for both the peptic ulcer group (17.6 μg) and the normal control group (23.7 μg). Patients in whom aspirin or alcohol may have precipitated the bleeding had significantly lower levels than in the patients with no such precipitating factors. Subclinical scurvy was thought to be a factor in maintaining hemorrhage initially precipitated by aspirin or alcohol. Poor dietary intake of Vitamin C is the most probable explanation for the low LAA levels.

4026 **EPIDEMIC SALMONELLOSIS IN HOSPITALS AND INSTITUTIONS.** *(E.)* Schroeder, S. (Natl. Commun. Dis. Ctr., Atlanta, Ga.), B. Aserkoff and P. Brachman. *New Eng J Med* 279(13):674-678, 1968.

The Salmonella Surveillance Report covering the 1963-1967 period in the United States is reviewed. A total of 40 epidemics were reported; these occurred in newborn nurseries, pediatric wards, general-hospital wards, nursing homes, and mental institutions; they involved 3025 patients and 43 deaths. Cross-infection epidemics most frequently involved children, and had a higher case:fatality ratio than common-vehicle outbreaks, which were usually limited to adults. The serotype most frequently isolated was *Salmonella typhimurium.* It was noted that the early detection of outbreaks requires an alert hospital surveillance system. In common-vehicle outbreaks, which are most often due to eggs or egg products, the contaminated vehicle must be identified and removed as quickly as possible. Cross-infection outbreaks are more difficult to halt, requiring prompt identification and isolation of *Salmonella* excreters and vigorous enforcement of hygienic techniques.

4027 **PERFORATION OF THE GASTROINTESTINAL TRACT IN INFANCY AND EARLY CHILDHOOD.** *(Ger.)* Hofmann, S. (Surg. Clin., U. Mainz, Germany) and P. Petrausch. *Deutsch Med Wschr* 93(32):1503-1509, 1968.

The incidence, etiology, diagnosis, prognosis, and treatment of gastrointestinal perforation in infancy (up to 4 yr of age) are discussed on the basis of 24 personal cases and a review of the literature (82 refs.). Among 24 children (19 boys and 5 girls) treated surgically for perforation during the period 1957-66, 2 cases involved the stomach, 1 the duodenum, 10 the jejunum or ileum, 2 a Meckel's diverticulum, 5 the cecum, and 4 the colon. Prenatal perforation, postoperative perforation, and 62 cases of perforated appendicitis encountered during the same time period are not considered. The most common symptom was meteorism and intestinal spasm (24 cases), followed by vomiting (22), dyspnea and cyanosis (13), bloody stools (6), hematemesis (4), and a radiological finding of pneumoperitoneum (9 of 21). The 14 deaths, including all 5 cases of necrotizing enterocolitis, were all due to rapidly advancing peritonitis. The 10 survivors included 2 of 8 seen during the first week of life, 4 of 8 aged 2-12 months, and 4 of 5 aged 2-4 years. Both the incidence and the mortality of this condition decrease rapidly with age, but diagnosis is made difficult by the multiplicity of possible causes and the prognosis is generally poor unless laparotomy is resorted to as early as possible. Some of the possible causes are: rupture due to congenital muscle defects, trauma, high-pressure respiration, insufflation of contrast media, atresia or stenosis of the lower tract, volvulus, invagination or incarceration of an intestinal loop, foreign bodies, meconium ileus or congenital megacolon, perforated ulcers due to acidity changes or stress, local necrosis due to internal pressure, septicemia, vascular spasms and embolisms, or inflammations (e.g., ulcerative enteritis, enterocolitis, diverticulitis), and tumor perforations.

4028 **ACIDOSIS IN INFANTILE GASTROENTERITIS AND ITS TREATMENT WITH THAM.** *(Ger.)* Rumler, W. (Pediat. Clin., Martin-Luther U., Halle/Wittenberg, Germany) and U. Sitka. *Z Kinderheilk* 103(1):52-60, 1968.

Dehydration, metabolic acidosis and coma are the three leading symptoms of infantile gastroenteritis. This acidosis is completely or partially compensated and is caused by excess lactate. Although only a symptom of the underlying disorder, its severity reflects the decrease in circulating blood volume and is therefore a reliable age-independent index of both the diagnosis and the prognosis. Van Slyke diagrams of the acid-base status of such infants, for example, reveal three distinct groups of values: those characteristic of pretoxicosis with a pH averaging about 7.3, those characteristic of either neurotoxicosis or dehydration toxicosis with a pH of about 7.2, and moribund infants with pH values below 7.0. Experience with more than 200 such infants (less than 1 yr old) treated for toxicosis during the period 1964-67 indicated that the average mortality decreases from 67% among moribund infants to 13-18% among those admitted with a pH of 7.01-7.20, 5% among those with an initial pH of 7.21-7.30, and 0% among those with pretoxicosis (pH above 7.30). In order to avoid the sodium loading which is inescapable with bicarbonate therapy, preference is now given to tris(hydroxymethyl)aminomethane (THAM) in the form of its acetate buffer at pH 8.6; the 1.5 M solution is diluted 1:4 with 10% glucose and infused dropwise for 2 hr in a dose (of 0.3 M solution) given by: base-deficit x kg body weight x 0.3. As a result, the mortality due to dehydration toxicosis decreased from 22.7% in 1954-63 (before the use of THAM) to 8.9% in 1964-67, although that due to neurotoxicosis decreased only from 31.4% to 23.9%. Some moribund infants were found to have irreparable acidosis which could not be controlled with THAM; a few of these cases responded to methylene blue (2-3 mg/kg i.v.), but in most cases the response was only transitory. The only side effect ascribable to THAM was respiratory alkalosis in some patients in whom the buffer was infused too fast. It is emphasized that death in infantile gastroenteritis is due to shock, not to acidosis or dehydration *per se*, and that the control of shock must be the first concern. Once this is accomplished, however, the prognosis can be greatly improved by controlled antacid therapy with THAM.

4029 **HYPO-β-LIPOPROTEINEMIA AND INTESTINAL LYMPHANGIECTASIA: A NEW SYNDROME OF MALABSORPTION AND PROTEIN-LOSING ENTEROPATHY.** *(E.)* Dobbins, W. O. III (Duke U. Med. Ctr., Durham, N. C.). *Arch Intern Med* 122:31-38, 1968.

A patient with features of congenital β-lipoprotein deficiency and intestinal lymphangiectasia is reported. The patient's illness was characterized by chronic diarrhea, mild steatorrhea, mild intestinal protein loss, and severe proximal muscle weakness without neurological abnormalities. Laboratory studies included markedly decreased plasma β-lipoprotein levels and total cholesterol of 84-98 mg/100 cc. Intestinal biopsy revealed club-shaped villi filled with PAS-negative macrophages and dilated lacteals. Electron microscopy revealed lipid retention within intestinal absorptive cells, chylomicron retention, and lipophages throughout the lamina propria. Possibly lipophage infiltration of intestinal lymph nodes resulted in the lymphangiectasia and protein-losing enteropathy. Malabsorption was probably secondary to both lymphangiectasia and β-lipoprotein deficiency.

4030 **PROTEIN-LOSING ENTEROPATHY AND GASTROINTESTINAL HEMORRHAGE ASSOCIATED WITH A BENIGN MESENCHYMOMA IN MESEN-TERY.** *(E.)* Rosati, L. A. (U. Michigan Med. Ctr., Ann Arbo and H. A. Oberman. *Arch Intern Med* 122:50-53, 1968.

A 34-yr-old man with protein-losing enteropathy and gastrointestinal bleeding due to a primary benign mesenchymal tumo in the mesentery is presented. At autopsy the mesenteric tum measured 12 cm in greatest dimension and involved the wall o the terminal duodenum and proximal jejunum. The tumor wa pale, firm, and spongy. Because of the association of blood and lymph vessels, prominent smooth muscle bundles, and adipose tissue in the tumor, it was considered a benign mesenchymoma; however, if the adipose tissue is rejected as a component, the tumor might also be categorized as a hamartoma. It is postulated that the tumor caused mechanical obstruction to the efferent flow of lymph from the gut and resulted in ectasia of lymphatics in the villi with protein-rich lymph. The intestinal bleeding may have been due to focal disruption of tumor blood vessels.

4031 **A FAMILY STUDY OF PERNICIOUS ANEMIA. II. INTRINSIC FACTOR SECRETION, VITAMI B_{12} ABSORPTION AND GENETIC ASPECTS OF GASTRIC AUTOIMMUNITY.** *(E.)* Wangel, A. G. (Radcliffe Infirm., Oxford, England), S. T. Callender, G. H. Spray and R. Wright. *Brit J Haemat* 14(2):183-204, 1968.

A reasonably good correlation between the presence of the gastric parietal cell antibody and impairment of gastric secretion was observed in the relatives of patients with pernicious anemia. Nearly one-fifth of those relatives lacking the antibod secreted unexpectedly small amounts of intrinsic factor. There was a highly significant correlation between the amounts of acid secretion and intrinsic factor secretion in response to histamine or gastrin. Of the probands in this study, 22% had a family history of pernicious anemia; 18% thyroid disease; 20% diabetes mellitus; and 3.8% gastric carcinoma. The excess of blood group A in the patients with pernicious anemia was insignificant, and the proportion of patients with Le^a-positive

RBC was lower than that found in the general population. Neither in the probands nor in their relatives was there any association between blood group A or the Le^{a}-group and the tendency to form circulating antibodies to gastric parietal cells There was no correlation between gastric parietal cell antibodies and light-colored eyes versus dark-colored eyes, nor was there a higher incidence of the antibodies in patients with a history of premature greying. The gastric parietal cell antibod was no more common in the spouses of probands than in matched control subjects. It was as common in relatives of probands lacking the antibody as it was in relatives of proband with the antibody. An analysis of 3 families in which both parents had pernicious anemia and of 7 families in which it wa possible to study both parents of the proband suggested that the tendency to form the antibody is inherited as a dominant characteristic with an incomplete degree of penetrance.

4032 POSTOPERATIVE GASTROINTESTINAL FISTULAS. *(E.)* Miller, H. I. (Boston City Hosp., Mass.) and B. C. Dorn. *Amer J Surg* 116(3):382-386, 1968.

Among 40 patients with postoperative gastrointestinal fistulas seen at the Boston City Hospital and University Hospital during a 4-yr period, 12 died, including 5 of 11 with gastric and duodenal fistulas, 5 of 16 with small bowel fistulas, and 2 of 13 with lower ileal and large intestinal fistulas. Among the 11 gastric, gastrojejunal and duodenal fistulas, 5 involved the duodenal stump (2 of 5 died), 4 originated in a gastrojejunal anastomosis (2 of 4 died), one patient died of a lateral fistula, and one survived despite persistent gastrostomy. Among the 16 patients with small bowel fistulas, 10 were treated by reoperation (2 of 10 died) and 6 were treated conservatively (3 of 6 died); the causes of the fistulas were small bowel resection (5), dehiscence (4), intestinal obstruction (3), ventral herniorrhaphy (2), a Whipple operation (1), and a Wertheim operation (1). Among the 13 postoperative fistulas of the lower ileum and colon, 4 followed a right colectomy, 4 followed acute appendicitis (2 of 4 died), 2 followed a hysterectomy, and 1 each followed ventral herniorrhaphy, total cystectomy, and an extensive upper abdominal resection; 5 of the 13 fistulas were treated operatively. The causes, prognosis and treatment of postoperative gastrointestinal fistulas are discussed on the basis of this experience and a review of the literature (10 refs.), and it is concluded that the best treatment for these complications (especially for the frequently serious gastric and duodenal fistulas) is their prevention by more careful surgery. Resection is recommended for small bowel fistulas, while most colonic fistulas close spontaneously following conservative treatment (collection and replacement of fluid and electrolyte losses, maintenance of nutrition, antibiotics, skin care, relief of obstruction, and drainage).

4033 BILE PERITONITIS: DIAGNOSIS AND COURSE. *(E.)* McCarthy, J. D. (Lovelace Clin., Albuquerque, N. M.) and J. G. Picazo. *Amer J Surg* 116(5): 664-668, 1968.

Among 8 cases of bile peritonitis (4 men and 4 women, 24-73 yr old) seen at the Lovelace Clinic and Bataan Memorial Methodist Hospital during a 5-yr period, 2 were classed as "severe" (death due to T-tube displacement and failure of the common bile duct anastomosis in patients operated on for pancreatitis and cancer of the pancreas, resp.), 2 were classed as "moderate" (definite but nonfatal peritoneal inflammation following hepatic duct trauma and partial hepatectomy, resp.), 2 were classed as "mild" (evidence of postoperative bile leakage due to T-tube complications, without development of major illness), and 2 were classed as "slight" (presumptive evidence of a small common bile duct leak without clinical illness). The serum bilirubin was elevated in all 8 cases (to 1.9-19.5 mg%), and in all 6 cases in which the serum alkaline phosphatase was subsequently elevated (to 6.8-19.8 Bodansky units), there was a definite lag period (2-14 days) between the two findings. The alkaline phosphatase also remained elevated long after the serum bilirubin returned to normal in the 6 patients who recovered. Bile cultures were negative in 4 cases and positive in 4 (including the 2 fatalities), but it is concluded that bile peritonitis is probably aggravated by bacterial contamination. A sharp rise in serum bilirubin (although not in serum alkaline phosphatase) following leakage of bile into the abdominal cavity was confirmed by experiments on female rats (55 days old) subjected to section of the common bile duct; ligation of the common bile duct also produced jaundice, but not fatal peritonitis. Essentially all of the increase in serum bilirubin could be accounted for by conjugated bilirubin. The rise in serum alkaline phosphatase in bile peritonitis (although without a clear lag period) was confirmed by studies on 2 male dogs, one of which had a longitudinal segment of the common bile duct removed to produce "uncontrolled bile peritonitis", and death in 3 days, while the other was subjected to i.p. injection of gallbladder bile (0.8-1.1 ml/kg/day) plus treatment with procaine penicillin (1,200,000 U b.i.d.) to produce "controlled bile peritonitis". The serum bilirubin, fasting blood sugar, and serum liver enzymes also increased in both dogs.

4034 TUBERCULOUS PERITONITIS. *(E.)* Judd, D. R. (St. Louis U. Surg. & Med. Svc., Mo.), G. B. Starkloff and F. A. Zacharewicz. *Southern Med J* 61(8): 797-800, 1968.

The laboratory findings, clinical manifestations, diagnosis, prognosis and treatment of tuberculous peritonitis are discussed on the basis of the literature (11 refs.) and 6 personal cases (3 men and 3 women, 21-82 yr old); 4 of these 6 patients were Negroes and 1 had hepatic cirrhosis, and it is pointed out that there is a marked tendency for tuberculous peritonitis to occur in Negroes and cirrhotics. The most common symptoms were abdominal enlargement and pain, weight loss, and fever; the most common physical finding was ascites. In each case, laparotomy revealed whitish nodules of various sizes studding the affected surfaces and viscera and containing tubercle bacilli. Only one of the 6 had associated tuberculosis in other organs. After daily therapy streptomycin, p-aminosalicylic acid and isoniazid for up to 24 months, all recovered completely.

4035 TYPES AND DISTRIBUTION OF BACTERIAL ENTEROPATHOGENS ASSOCIATED WITH DIARRHEA IN VIETNAM. *(E.)* Gaines, S. (Walter Reed Army Inst. Res., Saigon, Vietnam) and N. T. Nhu-Tuan. *Milit Med* 133(2):114-127, 1968.

Rectal swabs which were collected in Cary-Blair transport medium from 8243 patients with diarrhea and 777 asymptomatic patients (all Vietnamese) during the period from December

1965 to December 1966 were cultured and examined for the presence of bacterial pathogens. The 3591 positive rectal swabs from diarrhea patients yielded 4047 pathogens, including 1879 cases of *Vibrio cholerae*, 192 of *Salmonella*, 606 of *Shigella*, 250 of *Providence* organisms, 14 of *Alkalescens-Dispar* organisms, 108 of *Arizona* organisms, 741 of *Proteus*, 257 of *Escherichia coli*, and 100 of *Pseudomonas*. The 139 positive swabs from control patients yielded 158 pathogens, including 2 cases of *Vibrio cholerae*. Studies with antibiotic-sensitivity disks showed that *Vibrio cholerae* was sensitive to the majority of the antibiotics tested, whereas *Shigella* and most *Pseudomonas* strains were resistant to all. The *Proteus* strains isolated were resistant to all antibiotics except neomycin and streptomycin. Although the *Salmonellae* exhibited sensitivity to tetracycline, streptomycin, terramycin, and aureomycin, *E. coli* and the *Providence* group were sensitive only to neomycin and streptomycin. Almost all of the *Alkalescens Dispar* group tested were sensitive to streptomycin and tetracycline. The *Proteus, Pseudomonas*, and *E. coli* isolates listed were isolated from children under 15 yr of age, and most were isolated from children less than two years of age. All other organisms were from individuals of all ages.

4036 FECAL STEROLS IN INFANTS: BILE ACIDS AND STEROIDS. *(E.)* Gustafsson, J.-A. (Dept. Chem., Karolinska Inst., Stockholm, Sweden) and B. Werner. *Acta Physiol Scand* 73:305-310, 1968.

The feces of 31 healthy infants on an ordinary infant diet were studied for their predominant sterol composition by gas-liquid chromatography and gas chromatography plus mass spectrometry. Cholesterol, β-sitosterol, and campesterol were the predominant sterols in feces of infants less than 1 yr old. At 1 yr of age coprostanol began to appear in the feces, indicating that this is the time when microorganisms become established in the intestinal tract. After 1 yr of age the predominant fecal sterols were coprostanol, cholesterol, campesterol, 24α-ethylcoprostanol, and β-sitosterol. The sterol pattern, however, showed considerable individual variation in infants from 5 months of age to the highest age investigated (21 months).

4037 ZOLLINGER-ELLISON SYNDROME COMES OF AGE: RECOGNITION OF THE COMPLETE CLINICAL SPECTRUM AND ITS MANAGEMENT. *(E.)* Zollinger, R. M. (Ohio State U. Coll. Med., Columbus) and F. T. Moore. *JAMA* 204(5):361-365, 1968.

Problems in the physiopathology, clinical diagnosis and surgical management of ulcerogenic, non-beta, islet-cell tumors of the pancreas are discussed on the basis of personal experience and a review of the literature (16 refs.); some of the variables encountered are illustrated by the case histories of 5 patients (3 men and 2 women, 24-65 yr old) treated at the hospital of the Ohio State University College of Medicine. Two of these cases (a 65-yr-old woman with a malignant ulcerogenic tumor of the pancreas revealed by gastric hypersecretion, a positive Lai rat bioassay for serum gastrin, and recurrent jejunal ulcer following vagotomy and partial gastrectomy, and a 63-yr-old man in whom an ulcerogenic tumor was diagnosed on the basis of a relatively fixed high concentration of free HCl (110-120 mEq/liter) both before and after histamine stimulation) were designed to illustrate the importance of gastric analysis and Lai bioassay in the diagnosis of these tumors. Another patient (53-yr-old Negro male with a fixed high free HCl concentration and recurrent jejunal ulcer, but a negative Lai bioassay, due apparently to aberrant, carcinoid-like, islet-cell tumors in the wall of the duodenum, surrounded by hypertrophied Brunner's glands) was presented to illustrate the value of meticulous surgical exploration and operative monitoring of gastric secretion. The final two cases (a 35-yr-old man in whom chronic severe diarrhea and hypersecretion were alleviated by simple resection of a single isolated pancreatic tumor, without gastrectomy, and a 24-yr-old woman with chronic watery diarrhea and resultant hypokalemia ("pancreatic cholera") due to multiple pancreatic adenomata and biliary hypersecretion, who had a strong family history for both ulcers and the Zollinger-Ellison syndrome) were intended to illustrate the diarrheal syndromes which can accompany these conditions.

4038 GASTROINTESTINAL BLEEDING OCCURRING IN PATIENTS WITH ACQUIRED VALVULAR HEART DISEASE. *(E.)* McNamara, J. J. (Harvard Med. Sch., Boston, Mass.) and W. G. Austen. *Arch Surg* 97(4):538-540, 1968.

Gastrointestinal bleeding occurred in 26 (18 preoperatively, 8 postoperatively) of 211 patients with aortic valve replacements and 5 (3 preoperatively, 2 postoperatively) of 110 patients with mitral valve replacement. Transfusions were required in 17 of these patients. Eight patients (6 preoperative, 2 postoperative) with aortic valve disease required surgery, while none did in the mitral valve group. Anticoagulant treatment (warfarin sodium) was implicated as a possible cause in 5 patients with postoperative bleeding, but anticoagulants were also given uneventfully to 10 preoperative bleeding cases. The bleeding site was identified in 21 of 26 aortic valve patients (18 with duodenal ulcer, 3 with gastritis) and in all 5 of the mitral group (4 with duodenal ulcer, 1 with gastritis). Gastrointestinal bleeding was much more frequent in men in both groups (15% in the aortic group, 10% in the mitral group, compared to 7% and 1% for women). No definite conclusion is drawn as to the causal connection between valve disease and gastrointestinal bleeding. However, these patients represent a major "stress" group and seem to present an increased risk of bleeding on that basis. The higher incidence of gastrointestinal bleeding in the aortic group may be explained by the greater incidence of aortic valve disease in men. All patients had been observed for from 7 months to 3.5 yr following operation, and only one had any further difficulty with bleeding.

4039 PANCREATICODUODENECTOMY FOR ZOLLINGER-ELLISON SYNDROME. *(E.)* Waddell, W. R. (U. Colorado Med. Ctr., Denver), W. R. Coppinger and R. W. Loughry. *Ann Surg* 168(4):641-654, 1968.

Case histories are presented for 4 patients with Zollinger-Ellison syndrome treated by pancreaticoduodenectomy. The gastric secretory volume before operation ranged from 1992 to 7176 ml/day without stimulation, and the acid concentration during a 12-hr overnight period was between 14 and 135 mEq/liter. After pancreaticoduodenectomy, the secretory volume ranged from 312 to 552 ml/day with acid concentrations of 0-17 mEq/liter in the overnight and basal period and 3-93 mEq/liter after maximal histamine stimulation (1.7 mg/kg betazole HCl s.c.). This is considered to be strong evidence

at the removal of normal and abnormal sources of gastrin,
nether neoplastic or otherwise, is followed by significant re-
ction of gastric secretion levels. Patients with nonresectable
alignant tumors of the pancreas and those with hepatic and
tensive lymph-node metastases should have total gastrectomy.
tients with localized disease in the duodenum and the head
the pancreas, even with pancreatic lymph-node metastases,
ould have pancreaticoduodenectomy if total extirpation of
e gross malignant disease can be achieved. Patients with re-
ctable lesions of the tail and body of the pancreas should
ve partial distal pancreatectomy over to the superior mesen-
ric vessels and total gastrectomy. A concept is suggested of
ntrum, duodenum and pancreas as an endocrine organ of
ommon embryologic origin and some physiologic considera-
ons are discussed.

040 **BILATERAL SELECTIVE VAGOTOMY IN PREVENTION OF POST-VAGOTOMY
IARRHOEA.** *(E.)* Frohn, M. J. N. (West London Hosp.,
ngland), S. Desai and H. Burge. *Brit Med J* 1(5590):481-483,
968.

study was made of 321 vagotomy patients (181 with anterior
elective vagotomy and 140 with bilateral selective nerve sec-
ion) to determine the value of each technique in the preven-
ion of post-vagotomy diarrhea. In all cases, selective vagotomy
vas combined with pyloroplasty. Thirty patients (16.6%) who
nderwent anterior selective nerve section had diarrhea of
arying severity compared to only 3 patients (2.1%) of the bi-
ateral selective group. Other surveys noted have shown a
igher incidence of diarrhea following total vagotomy. The
pinion is expressed that a hepatic plexus rather than a single
epatic branch of the vagus nerve innervates the liver, biliary
ystem and pyloroduodenal region, so that if a single hepatic
erve is carefully dissected free, the plexus must be in large
art destroyed; consequently, post-vagotomy diarrhea results
rom the denervation of these other organs rather than of the
tomach itself. Diarrhea can be prevented by bilateral selective
vagotomy in a large percentage of patients.

4041 **VIRAL INFECTIONS IN HOSPITALIZED NEONATES.** *(E.)* Sanders, D. Y. (Ohio State U. Coll. Med., Columbus) and H. G. Cramblett. *Amer J Dis Child* 116(9):251-256, 1968.

Virological and bacteriological studies were carried out in 67 infants with suspected sepsis and 38 control infants to determine the presence of viral infections. Throat washings and anal swabs were collected for 2 consecutive days from each infant. Urine, cerebrospinal fluid and blood specimens were collected when available. Viruses were recovered from 10 of the sick infants and from 1 control (herpes simplex). In three infants it was possible to demonstrate a fourfold or greater rise in neutralizing antibody to the agent recovered. Case reports are presented of 2 infants who had infections with echovirus 17 and of one infant with severe diarrhea associated with echovirus 6 infection. It is noted that echovirus 17 has not been previously associated with illness in the neonate. All of the infants survived except a baby with cytomegalic inclusion disease who died on the 35th hospital day. Only one infant had residual disease and this infant did not have serologic evidence of viral infection. Other viral infections noted were adenovirus 2, coxsackie A-9, herpes simplex, echovirus 11, and an unidentified enterovirus.

4042 **VILLOUS TUMORS OF THE UPPER GASTROINTESTINAL TRACT: CLINICAL REVIEW AND REPORT OF A CASE.** *(E.)* Bremer, E. H. (Washington, D. C.), W. G. Battaile and P. H. Bulle. *Amer J Gastroent* 50(2):135-143, 1968.

The case history of a 51-yr-old woman with a villous adenoma of the jejunum, just distal to the ligament of Treitz, is presented. Villous tumors of the upper gastrointestinal tract are rare, and lack of uniform terminology for this tumor type make reported cases seem fewer. As in other reported cases, the findings included occult blood with and without frank tarry stools, general weakness, and secondary anemia; vague gastric discomfort to true epigastric pain characterize the condition. Radiological identification of villous small bowel tumors is difficult; air contrast and barium enemas failed to disclose the lesion in this case. Exploratory laparotomy, after anemia correction, revealed the mass in the jejunum. Villous tumors of the upper gastrointestinal tract do not differ from their counterparts in the colon and rectum. There is no sex or race predominance, and the incidence increases in the 6th and 7th decades. Malignant transformation is more likely to appear in the larger lesions. The lesion can recur and there is a significant 58% malignancy incidence which is of clinical importance.

4043 **GASTRIC VOLVULUS AND HIATUS HERNIA.** *(E.)* Ruckley, C. V. (Western Gen. Hosp., Edinburgh, Scotland) and J. Fraser. *J Roy Coll Surg Edinb* 13(4):217-225, 1968.

Case histories are presented for 3 women (78, 80 and 62 yr old) with gastric volvulus and hiatus hernia. In case 1, secondary gastric volvulus was attributed to the leukemic enlargement of the spleen and neoplastic mesenteric glands. Descent of the enlarged spleen established a gastric rotation which was on an antero-posterior axis; this had probably taken place over many weeks. A week prior to admission the rotation led to pyloric obstruction due to kinking while the fundus was anchored by enlarged glands in a paraesophageal sac. A viscious circle developed with fluid retention, gastric dilatation above and below the diaphragm and organo-axial rotation. The defect was repaired but 9 days after gastroenterostomy the patient died. In case 2, a paraesophageal hernia had become larger 3 wk before admission; full obstruction associated with acute pancreatitis had developed 24 hr before admission. It appeared that the pancreatitis was caused by the anatomical distortion resulting from traction on the structures at one or both of the tethered ends of the stomach (there was also marked distention of the gallbladder). After the fundus had been sutured to the peritoneum of the anterior abdominal wall and the enlarged hernia had been narrowed, the patient developed bronchopneumonia and cardiac failure and died 5 days postoperatively. In case 3, it was assumed that the initial displacement of the stomach within the hernial sac had been in an organoaxial plane and had been present for several years. An intraperitoneal band (a major factor in the final strangulation and ischemia of the stomach) was a secondary feature arising from numerous episodes of peritoneal irritation. Partial gastric resection and pyloroplasty were performed, followed by uneventful recovery.

4044 THE PELVIC ILEUM SYNDROME AND INTESTINAL INSUFFICIENCY IN THE DIGESTION AND ABSORPTION OF CARBOHYDRATES. *(E.)*

Marina-Fiol, C. (Jimenez Diaz Found., Madrid, Spain) and R. M. Baiocchi. *Digestion* 1(2):94-106, 1968.

Fecal pH, 24-hr fecal lactic acid, and jejunal mucosa disaccharidase activity was measured in 40 patients with clinically and radiologically diagnosed pelvic ileum syndrome. Lactic acid elimination was determined after single doses of 20, 50 and 100 g of oral lactose and fractionated doses (30 and 50 g/meal, 3 times daily) of 90 and 150 g. No increases in fecal lactic acid were noted with single doses of lactose or with 90 g/day. After 150 g/day for 2 days, disaccharidase insufficiencies were observed in 5 of 7 patients with high fecal lactic acid levels. A test meal consisting of raw wheat flour, milk, and sucrose was given to 10 patients; only 2 patients showed increases in lactic acid excretion. When amylase and invertase were added to the test meal, lactic acid excretion decreased ten-fold. Upon radiological examination, pronounced gastric atony with slow evacuation and increased passage of the contrast medium through the small intestine was observed in 50% of the cases 30 to 45 min after 100 g of barium and a 50 g lactose overload; hypertonic fragmentation of small intestine loops was prominent. Gases filling the pelvic ileum before overloading accumulated in the transverse colon and the splenic angle. Colonic mucosa appeared finely granular in some cases; this was attributed to lactose passage into the colon intact and mixed with barium. In some cases these changes did not occur when the amylase-invertase preparation was given with the barium and lactose. These data indicate that pelvic ileum syndrome is the clinical and radiological expression of minor carbohydrate absorption insufficiencies.

4045 INTERSTATE OUTBREAK OF *SALMONELLA NEWBRUNSWICK* INFECTION TRACED TO POWDERED MILK. *(E.)*

Collins, R. N. (Natl. Comm. Dis. Ctr., Atlanta, Ga.), M. D. Treger, J. B. Goldsby, J. R. Boring III, D. B. Coohon and R. N. Barr. *JAMA* 203(10):838-844, 1968.

The epidemiological investigation of a 17-state outbreak of gastroenteritis due to *Salmonella newbrunswick* (29 cases) and of the milk-drying and instantizing plant that produced the instant nonfat powdered milk which was found to be the carrier of the infection is described in detail. The parents of the infected children were first interviewed as to the diet used in order to isolate the carrier, and instant nonfat dry milk was the item most frequently mentioned. Further investigation resulted in the isolation of the milk-drying plant that was the source of the contaminated dry milk. The equipment and processing methods in this plant were conducive to the introduction and spread of salmonellae, and the same serotype was isolated from samples of their product. The mode of initial contamination of the plant, however, remained obscure. Subsequent surveys of other milk-drying plants resulted in the isolation of numerous *Salmonella* serotypes from dried milk products. Instant nonfat dry milk should be looked upon as a possible source of infection in future epidemiologic investigations of human salmonellosis.

4046 LIPOFUSCINOSIS OF THE GASTROINTESTINAL TRACT IN MAN. *(E.)*

Fox, B. (Charing Cross Hosp. Med. Sch., London, England). *J Clin Path* 20(6):806-813, 1967.

Three cases of lipofuscinosis (brown pigmentation) of the gastrointestinal tract are discussed in some detail. The upper part of the small intestine was found to be the site of the greatest pigmentation and pigment was noted to be present in all the muscle layers of the intestine, including the muscularis mucosae. It was also found in the walls of the blood vessels and within macrophages. It is suggested that vitamin E deficiency is the underlying cause of this phenomenon, which is also seen with steatorrhea and hypoalbuminemia. The possible mechanism of vitamin E deficiency in these diseases is discussed.

4047 INFANTILE GASTROENTERITIS DUE TO WATER WITH HIGH SULFATE CONTENT. *(E.)*

Chien, L. (Dept. Pediat., Saskatchewan, Saskatoon, Canada), H. Robertson and J. W. Gerrard. *Canad Med Ass J* 99(3):102-104, 1968.

Three cases are presented in which infants developed diarrhea following ingestion of well waters with a sulfate content above 600 mg/liter. It is noted that water as a cause of diarrhea is often unsuspected since parents and older siblings are not affected by the laxative action of the water. This type of diarrhea is identifiable by the ease with which it can be induced or controlled through changing the source of the water. It can readily be differentiated from diarrhea due to infection caused by bacteria, viruses or parasites. It is recommended that waters with more than 400 mg/liter of sulfate be regarded as unsuitable for infant feedings.

4048 A GASTRIC FACTOR IN THE PATHOGENESIS OF THE ZOLLINGER-ELLISON SYNDROME. *(E.)*

Friesen, S. R. (U. Kansas Med. Ctr., Lawrence). *Ann Surg* 168(3):483-501, 1968.

Eleven patients with the Zollinger-Ellison syndrome were studied with regard to its pathogenesis and the mechanisms relating the stomach and the pancreatic islets. In 1 patient with characteristic findings of the Zollinger-Ellison syndrome and hyperparathyroidism, prompt regression of hepatic and pulmonary metastasis from non-beta islet-cell carcinomata occurred following total gastrectomy. Arrest of tumor growth and complete tumor regression occurred in at least 2 other total gastrectomized patients. It is suggested that there is a gastric factor affecting pancreatic islet cells, and that these changes and other clinical features of the Zollinger-Ellison syndrome may represent an end-stage of the duodenal ulcer diathesis. The many variants of this syndrome may be based on a genetic neurohumoral basis.

4049 IDENTIFICATION OF THE DIARRHEOGENIC HORMONE ASSOCIATED WITH NON-BETA ISLET CELL TUMORS OF THE PANCREAS. *(E.)*

Zollinger, R. M. (Ohio State U. Coll. Med., Columbus), R. K. Tompkins, J. R. Amerson, G. L. Endahl, A. R. Kraft and F. T. Moore. *Ann Surg* 168(3):502-521, 1968.

The etiological factor in the production of the clinical triad of watery diarrhea, hypokalemia, and achlorhydria was vestigated in 2 women (24-47 yr old) with non-beta islet-ell tumors. Preoperative gastric anacidity in both patients as overcome by histamine stimulation. At operation, panreatic islet-cell tumors were found. Chemical analysis of ilute bile distending the gallbladder showed elevated bicaronate and chloride concentrations consistent with a secretin-ke effect. Removal of the tumor in the surviving patient esulted in a prompt rise of gastric acid to normal levels. his inhibition of gastric secretion is consistent with a secretin-ke effect. An extract of metastatic liver tumor administered o dogs as a bioassay showed a classical secretin-like pancreatic esponse, and explosive diarrhea occurred in 2 dogs receiving ontinuous intravenous infusion of the active tumor-cell exract. It is suggested that a secretin-like hormone of islet-cell rigin is the etiological factor in this clinical triad.

4050 **PHYSICOCHEMICAL STUDIES OF THE CARCINOEMBRYONIC ANTIGENS OF THE HUMAN DIGESTIVE SYSTEM.** *(E.)* Krupey, J. (Montreal Gen. Hosp., Quebec, Canada), P. Gold and S. O. Freedman. *J Exp Med* 128(3):387-398, 1968.

Purification and characterization of the chemical composition of carcinoembryonic antigens (CEA) found in various digestive system cancers were attempted, and a comparison was made of the physical and chemical properties of the CEA obtained from different locations in different patients and from identical fractions of comparable normal tissues. Extraction of human adult tumor tissue with 0.6 M perchloric acid followed by paper block electrophoresis and column chromatography resulted in highly purified CEA preparations as determined by both immunological and physicochemical criteria. There was a high degree of uniformity among the various samples. Sedimentation coefficients ranged from 6.9S to 8S. Each sample showed the presence of 14 different amino acid residues and 6 different carbohydrate constituents. A purified CEA preparation from a primary hepatoma which differed in some respects from metastatic tumor tissue preparations was probably due to non-CEA components in the hepatoma preparation. Normal adult tissue failed to show the presence of constituents similar to CEA. The CEA of the human digestive system are qualitatively tumor-specific and are not detectable in comparable normal tissues.

4051 **TREATMENT OF SEVERE POSTVAGOTOMY DIARRHEA BY REVERSED JEJUNAL SEGMENT.** *(E.)* Herrington, J. L. Jr. (Vanderbilt U. Med. Ctr., Nashville, Tenn.), W. H. Edwards, J. H. Carter and J. L. Sawyers. *Ann Surg* 168(3):522-539, 1968.

Seven patients (4 men and 3 women, average age 52 yr) with incapacitating diarrhea and weight loss following bilateral truncal vagotomy combined with either antrectomy or pyloroplasty were treated by reversal of a short jejunal segment. The reversed jejunal segment, which varied between 10 and 12 cm in length, was placed 48-90 cm distal to the Treitz ligament, far enough to prevent obstruction. This procedure completely relieved the diarrhea in each patient, caused substantial weight gains, and restored normal blood counts. The physiological delay in intestinal transit apparently alleviated the diarrhea. No gastric hypersecretion could be found in these 7 patients. Additional studies with 50% glucose on 4 of the 7 revealed that the reversed jejunal segment reduced the intestinal symptoms of the dumping syndrome. Jejunal wall biopsies performed in 3 cases did not show any abnormal histology. Several theories are advanced to explain the postvagotomy diarrhea.

4052 **PSYCHOGENIC VOMITING.** *(E.)* Hill, O. W. (Middlesex Hosp., London, England). *Gut* 9(3): 348-352, 1968.

The life histories of a group of 14 women and 6 men (average age 38 yr) suffering from psychogenic vomiting were compared with those of another group (13 men and 9 women, average age 38 yr) suffering from psychogenic abdominal pain without vomiting. One of the primary features which emerged among the vomiters was that of an individual locked in an inescapable hostile relationship with the family group. This was seen in 12 of the patients. Nine patients had lost a parent by death before reaching the age of 15, and 10 of the vomiters gave a history of being subject to recurrent spells of vomiting in childhood. Most of the patients lost weight during the vomiting period, and 3 showed symptoms of hypokalemia. Treatment consisted of verbal catharsis of the patient's hostility, a supportive relationship, and phenothiazine drugs.

4053 **GEOGRAPHICAL DISTRIBUTION OF GASTROINTESTINAL CANCERS IN INDIA.** *(E.)* Bhansali, S. K. (B. Y. L. Nair Charitable Hosp., Bombay, India). *Indian J Surg* 30(1):33-41, 1968.

4054 **TEMPORARY GASTROSTOMY AND FEEDING JEJUNOSTOMY IN ABDOMINAL SURGERY.** *(E.)* Fenn, A. S. (Christian Med. Coll. Hosp., Vellore) and J. Kristmukti. *Indian J Surg* 30(1):73-75, 1968.

4055 **DUPLICATION OF THE ALIMENTARY TRACT.** *(E.)* Udwadia, T. E. (Bai Jerbai Wadia Hosp. For Children, Bombay, India), M. B. Shah, S. J. Dalal and R. K. Ghandhi. *Indian J Surg* 30(1):71-72, 1968.

4056 **PERITONEAL MESOTHELIOMA FOLLOWING PNEUMOPERITONEUM MAINTAINED FOR TWELVE YEARS [CASE REPORT].** *(E.)* Brown, J. W. (Scripps Mem. Hosp., LaJolla, Calif.), K. A. B. Kristensen and L. S. Monroe. *Amer J Dig Dis* 13(9):830-835, 1968.

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4058 **GAUCHER'S DISEASE: ABNORMALITIES IN IMMUNOGLOBULINS.** *(E.)* Blattner, R. J. (Houston, Texas). *J Pediatrics* 73(4):626-628, 1968.

4059 **EPIDEMIOLOGY OF ENTERITIS CAUSED BY *ESCHERICHIA COLI* OF SEROTYPE 025 K11:6.** *(Rus.)* Khakhareva, T. P. (Gor'kiy Sci. Res. Inst. Epidemiol. Microbiol., USSR), N. I. Adueva and Ie. I. Beliaev. *Vop Okhr Materin Dets* (7):90, 1968.

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4062 PROTEIN MALNUTRITION IN GASTRO-INTESTINAL DISEASE. *(E.)* Neale, G. (Royal Postgrad. Med. Sch., London, England). *Postgrad Med J* 44(514):642-645, 1968.

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4066 EPIDEMIC OUTBREAK OF ORALLY-TRANSMITTED CHAGAS' DISEASE IN TEUTONIA (ESTRELA-RIO GRANDE DO SUL). *(Por.)* Nery-Guimaraes, F. (Oswaldo Cruz Inst., Rio de Janeiro, Brazil), N. N. da Silva, D. T. Clausell, A. L. de Mello, T. Rapone, T. Snell and N. Rodrigues. *Hospital (Rio)* 73(6):73-110, 1968.

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4082 CARCINOMA OF THE COLON, AMPULLA OF VATER AND URINARY BLADDER ASSOCIATED WITH FAMILIAL MULTIPLE POLYPOSIS: A CASE REPORT. *(E.)* Capps, W. F. Jr. (Queen Angels Hosp., Los Angeles, Calif.), M. I. Lewis and D. A. Gazzaniga. *Dis Colon Rectum* 11(4):298-305, 1968.

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086 THE PATHOGENESIS, CLINICAL CHARACTERISTICS AND TREATMENT OF POSTOPERATIVE IGESTIVE VISCEROPLEGIA. *(Fr.)* Roux, M. (81 Ave. de illiers, Paris, France). *Acta Gastroent Belg* 31(4/5):281-287, 968.

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4108 COMPARISON OF CANINE RESPONSES TO *ESCHERICHIA COLI* ORGANISMS AND ENDOTOXIN. *(E.)* Hinshaw, L. B. (U. Oklahoma Med. Ctr., Oklahoma City), L. A. Solomon, D. D. Holmes and L. J. Greenfield. *Surg Gynec Obstet* 127(5):981-988, 1968.

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4111 **THE GENUS *AEROMONAS* IN HUMAN BACTERIOLOGY: REPORT OF 30 CASES AND REVIEW OF THE LITERATURE.** *(E.)* Von Graevenitz, A. (Yale U. Sch. Med., New Haven, Conn.) and A. H. Mensch. *New Eng J Med* 278(5):245-249, 1968.

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4116 **KININS – POSSIBLE PHYSIOLOGIC AND PATHOLOGIC ROLES IN MAN.** *(E.)* Kellermeyer, R. W. (Lakeside Hosp., Cleveland, Ohio) and R. C. Graham Jr. *New Eng J Med* 279(15):802-807, 1968.

4117 **KININS – POSSIBLE PHYSIOLOGIC AND PATHOLOGIC ROLES IN MAN.** *(E.)* Kellermeyer, R. W. (Lakeside Hosp., Cleveland, Ohio) and R. C. Graham Jr. *New Eng J Med* 279(16):859-866, 1968.

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4120 **RUPTURE OF THE DIAPHRAGM FROM BLUNT TRAUMA.** *(E.)* Asbury, G. F. (3421-A Kitsap Way, Bremerton, Wash.). *Arch Surg* 97(5):801-804, 1968.

4121 **CONGENITAL ANOMALIES OF THE OESOPHAGO-GASTRO-INTESTINAL TRACT.** *(E.)* Bhasin, R. P. (Maulana Azad Med. Coll., New Delhi, India), S. P. Jain and K. S. Mehdiratta. *Indian Pediat* 5(6): 252-261, 1968.

4122 **INDUCTION OF GASTRIC AND PANCREATIC CANCER IN GUINEA PIGS BY MEANS OF METHYLNITROSOUREA AND METHYLNITROSOURETHAN.** *(Ger.)* Druckrey, H. (Max Planck Inst. Immunobiol., Freiburg i. Br., Germany), S. Ivankovic, J. Bucheler, R. Preussmann and C. Thomas. *Z Krebsforsch* 71(2):167-182, 1968.

4123 **INTESTINAL PNEUMATOSIS TREATED BY PYLOROPLASTY.** *(E.)* Dhall, D. P. (Dept. Surg. U. Aberdeen, Scotland), R. G. Mahaffy and N. A. Matheson. *J Roy Coll Surg Edinb* 13(4):226-229, 1968.

4124 **A CLINICAL STUDY ON BLIND LOOP SYNDROME.** *(Jap.)* Watanabe, Y. (Gifu U. Sch. Med., Japan), K. Murase, S. Watanabe, K. Kaya, E. Shimazu and M. Ando. *Arch Jap Chir* 37(5):717-726, 1968.

TRAUMATIC DIAPHRAGMATIC HERNIA. *(E.)* Pomerantz, M. (Duke U. Med. Ctr., Durham, .), B. M. Rodgers and D. C. Sabiston Jr. *Surgery* 64(3):529- 1968.

ong 20 men and 3 women ranging in age from 11 to 69, with matic diaphragmatic hernia, 18 patients had sustained blunt ma and 3 patients had sustained gunshot wounds of the chest. left diaphragm was involved in each case. Examination of e patients presenting immediately after injury commonly aled respiratory distress, marked tracheal deviation, and gas- d loops of bowel in the chest X-ray. Examination of those ents presenting at times remote from the initial injury com- nly revealed chronic symptoms such as postprandial fullness, pnea, abdominal cramps, and chest pain. None of the patients sented with intestinal obstruction or strangulation. All ents underwent repair of their ruptured diaphragm shortly r the diagnosis was made. Various abdominal viscera were nd within the chest in all cases. No difficulty was encountered educing the herniated viscera. Eleven patients had tears along left anterolateral portion of the diaphragm, 9 patients had acardiac tears, 2 patients had central tendon ruptures, and 1 ient had a posterior tear. Good results were obtained in all ients.

26 **PRIMARY ESOPHAGEAL ADENOCARCINOMA: REPORT OF 16 CASES.** *(E.)* Lortat-Jacob, J. L. eaujon Hosp., Clichy, France), J. N. Maillard, C. A. Richard, Fekete, M. Huguier and J. Conte-Marti. *Surgery* 64(3):535- 3, 1968.

558 patients with esophageal carcinoma, 16 had primary enocarcinomas arising entirely in the esophagus not involving e cardia. Patients were classified into 3 groups on the basis pathological examination. Three patients were classified as ype ordinaire," having differentiated tumors indistinguishable om carcinomas at the cardioesophageal junction. Five patients owed an association of areas of squamous carcinoma with andular-form carcinomatous areas, and 2 patients had tumors sembling that of the cylindromas of the cutaneous appendage the bronchi and the major salivary glands. Six patients ad adenocarcinomas arising from an esophagus lined with olumnar epithelium. Only surgical removal of the tumor was elt to permit survival of 5 years or longer.

127 **DETERIORATION OF ESOPHAGEAL PERISTALSIS IN PATIENTS WITH ALCOHOLIC EUROPATHY.** *(E.)* Winship, D. H. (Milwaukee County Gen. Iosp., Wisconsin), C. R. Caflisch, F. F. Zboralske and W. J. Iogan. *Gastroenterology* 55(2):173-178, 1968.

sophageal motor dysfunction was studied by intraluminal nanometry in 10 patients with peripheral neuropathy secondary o chronic alcoholism. Six patients with severe chronic alcohol- sm without neuropathy served as controls. None of the patients had dysphagia, odynophagia, heartburn, regurgitation, or other esophageal symptoms. In both groups the resting pressure of the inferior esophageal sphincter, the gastroesophageal pressure differential, the pressure inversion point, and the upper esophageal sphincter were normal. In the study group, abnormal motor function was most pronounced in the distal esophagus due to selective deterioration of esophageal peristalsis with preservation of sphincter function. It was not determined whether a muscular or nervous derangement was responsible for the observed motor disturbance. The differences in esophageal motor function between the study group and the control group does not appear to be related to the duration of alcoholic addiction.

4128 **ESOPHAGEAL TAMPONAGE IN THE TREATMENT OF MASSIVE BLEEDING FROM ESOPHAGEAL VARICES, WITH SPECIAL REFERENCE TO VOLUME AND PRESSURE IN THE BALLOONS.** *(E.)* Liedberg, G. (Dept. Surg., U. Lund, Sweden). *Acta Chir Scand* 134(3-4):249-253, 1968.

Direct measurements were made of the effective tamponage pressure in the esophagus using a Patton triple-lumen tube fitted with 2 individually inflatable latex balloons. It was found that it is often difficult, if not impossible, to determine the actual tamponage pressure, and that the esophageal balloon does not adapt itself to the variations in the width of the esophagus. Both of these drawbacks could be overcome by making the walls of the esophageal balloon thinner, its diameter larger, and its shape more ovoid. The wall of the upper end of the balloon should also be reinforced to prevent balloon herniation toward the mouth.

4129 **CEREBRAL LESIONS AS A CAUSE OF ESOPHAGEAL ULCERATION.** *(E.)* Edmondson, H. T. (Med. Coll. Georgia, Augusta), R. A. Gindin and G. C. Peebles. *Surgery* 64(4):720-727, 1968.

Twenty-three cases of esophageal hemorrhage or perforation are tabulated and analyzed as to age and sex, cerebral disease, esophageal symptoms and pathology, and clinical course. Several past studies are also discussed which report esophageal lesions accompanying intracranial disease, surgery, or trauma. The age of the patients ranged from 2 months to 88 yr with 3/4 of all patients being over 40. Out of 20 cases, 15 were men and 5 were women. Cerebral lesions were localized in 5 cases and general cerebral disease was present in 18 cases, 8 of which were infections. It is stated that any treatment for esophageal involvement would be conjecture and that a means of identifying patients who are likely to develop postoperative gastrointestinal hemorrhage is needed. Early diagnosis is not yet possible since the patient is usually unconscious and early symptoms are lacking. Selected patients under severe stress should be placed on a prophylactic "peptic ulcer" regimen (antispasmodics, antacids, and milk by mouth or nasogastric tube) with the prevention of upper gastrointestinal ulceration as the major objective.

4130 **"SPONTANEOUS" RUPTURE OF THE HEALTHY OESOPHAGUS.** *(E.)* Toghill, P. J. (Royal Sussex County Hosp., Brighton, England), C. F. MacGuire and P. S. Raut. *Postgrad Med J* 44(513):504-508, 1968.

Four cases (males, 53-79 yr old) of "spontaneous" rupture of the esophagus are presented with a description of the clinical features and radiological changes observed. It was noted that the site of the lesion is very constant, usually being found along the postero-lateral aspect of the lower third of the esophagus, and it is suggested that the absence of striated muscle in this segment of the esophagus together with a linear arrangement of the smooth muscle fibers may play a part in producing the lesion. Complete rupture of the esophagus allows the escape of fluid and air into the mediastinum, and from there it flows upward towards the lung hilum or laterally over the dome of the diaphragm. Spread of air in this way gives rise to the V-shaped shadow which is considered a pathognomonic sign of esophageal rupture. Rupture into the pleural space causes a pneumo- and/or hydrothorax in approximately 85% of the cases. In most cases, the diagnosis of rupture of the esophagus can be made on the basis of the clinical findings and by simple radiological techniques.

4131 DIAPHRAGMATIC HIATAL HERNIA AND ANGINA PECTORIS. *(E.)* Delmonico, J. E. Jr. (St. Joseph's Hosp., Syracuse, N. Y.), A. Black and G. G. Gensini. *Dis Chest* 53(3):309-315, 1968.

Among 301 patients referred for coronary arteriography because of a clinical diagnosis of angina pectoris, 117 had perfectly normal coronary vessels, and 40 of these showed evidence of esophagitis. In the present paper, 12 such cases (6 men and 6 women, 24-61 yr old) are described in detail. Each patient complained of heartburn plus "choking episodes," usually occurring at night. Further investigation led to the correct diagnosis of a culpable short esophagus tubular hiatal hernia. Following hiatal hernia repair, each patient was relieved of his original anginal and gastrointestinal complaints. In three of the cases, postoperative normalization of a previously positive Master two-step test also occurred. The data in this study suggest that a significant number of patients diagnosed as having angina pectoris may be suffering from the often disregarded or undiagnosed "small hiatus hernia." This may be due to the fact that most of these hernias remain undetected by conventional X-ray studies.

4132 CARCINOMA OF THE ESOPHAGUS INVOLVING THE VAGUS NERVES ASSOCIATED WITH GASTRIC RETENTION SIMULATING PYLORIC OBSTRUCTION: CASE REPORT. *(E.)* Thomas, T. P. (Northwestern U. Med. Sch., Chicago, Ill.), C. J. Staley and J. B. Hammond. *Amer J Dig Dis* 13(9):842-846, 1968.

4133 INTRAMURAL RUPTURE OF THE OESOPHAGUS. *(E.)* Marks, I. N. (Groote Schuur Hosp., Cape Town, Africa) and A. D. Keet. *Brit Med J* 3(5617):536-537, 1968.

4134 OESOPHAGEAL PAIN. *(E.)* Bennett, J. R. (David Lewis Northern Hosp., Liverpool, England). *Postgrad Med J* 44(514):573-574, 1968.

4135 HIATAL HERNIA. *(E.)* Davidson, J. S. (Royal Infirm., Bradford, England). *Postgrad J Med* 44(514):579-585, 1968.

4136 INCOORDINATION OF OESOPHAGEAL MOTOR ACTIVITY. *(E.)* Atkinson, M. (Worcester Royal Infirm., London, England). *Postgrad Med J* 44(514):577-578, 1968.

4137 EXPERIMENTAL THORACIC DUCT-TO-ESOPHAGUS SHUNT. *(E.)* Orszulok, J. (Inst. Hematology, Warsaw, Poland). *Pol Med Sci Hist* 11(3):111-114, 1968.

4138 COLON TRANSPLANTS AS ESOPHAGEAL REPLACEMENT: CINERADIOGRAPHIC AND MANOMETRIC EVALUATION IN CHILDREN. *(E.)* Sieber, A. M. (U. Pittsburgh, Pa.) and W. K. Sieber. *Ann Surg* 168(1):116-122, 1968.

4139 LOWER ESOPHAGEAL RINGS, WEBS, AND ANNULAR STRICTURES. *(E.)* Miller, D. W. Jr. (620 Park Ave. , New York City) and W. A. Wichern Jr. *Ann Thorac Surg* 6(4):401-412, 1968.

4140 FACTORS AFFECTING INCIDENCE OF ANASTOMOTIC LEAK FOLLOWING ESOPHAGOGASTRECTOMY: AN ANALYSIS. *(E.)* Cole, W. R. (Dept. Surg., Deaconess Hosp., St. Louis, Mo.), R. Petit and H. R. Bernard. *Ann Thorac Surg* 6(4):396-400, 1968.

4141 TREATMENT OF PEPTIC DISEASES OF THE ESOPHAGUS. *(Fr.)* Chalnot, P. (Fac. Med., U. Nancy, France) and P. Mathieu. *Ann Chir* 22(11/12):753-764, 1968.

4142 RESULTS IN PEPTIC ESOPHAGITIS: STATISTICAL REVIEW OF 135 CASES SEEN IN THE SURGICAL CLINIC OF BEAUJON HOSPITAL. *(Fr.)* Lortat-Jacob, J. L. (Beaujon Hosp., Paris, France). *Ann Chir* 22(11/12):765, 1968.

4143 COMPARATIVE EVALUATION OF THE REMOTE RESULTS OF X-RAY AND TELEGAMMA THERAPY (GUT-Co-400) IN CANCER OF THE ESOPHAGUS. *(Rus.)* Sopil'niak, M. G. (State Cancer Clinic, Ministry Health Latvian SSR, Riga) and A. D. Plisetskaia. *Klin Lech Zlokach Novoobraz* (10):217-220, 1964.

4144 SURGICAL TREATMENT FOR MEGA-OESOPHAGUS. *(E.)* Nicks, R. (Royal Prince Alfred Hosp., Sydney, Australia). *Brit J Surg* 55(7):525-530, 1968.

4145 DYSPHAGIA. *(Ger.)* Schamaun, M. (Chur. Canton Hosp., Switzerland). *Schweiz Med Wschr* 98(28):1025-1029, 1968.

4146 SQUAMOUS EPITHELIAL CARCINOMA OF THE ESOPHAGUS. *(E.)* Bergman, F. (Dept. Path. U. Umea, Sweden) and I. Gynning. *Geriatrics* 23(9):116-123, 1968.

4147 A UNIFIED APPROACH TO SURGICAL PROBLEMS OF THE ESOPHAGOGASTRIC JUNCTION. *(E.)* Thal, A. P. (U. Kansas Med. Ctr., Kansas City). *Ann Surg* 168(3):542-550, 1968.

48 BENIGN TUMORS OF THE ESOPHAGUS. *(Pol.)* Pawlicka, L. (Tuberculosis Inst., Warsaw, land). *Pol Przegl Radiol* 32(4):437-443, 1968.

49 PHARYNGO-ESOPHAGEAL DIVERTICULA AND DYSFUNCTION OF THE CRICOPHARYNGEUS USCLE. *(E.)* Smith, S. (Ochsner Found. Hosp., New Orleans, .) and B. C. Buchtel. *Southern Med J* 61(8):826-828, 1968.

150 AGENESIS OF THE RIGHT HALF OF THE DIAPHRAGM. *(E.)* Koontz, A. R. (Baltimore, d.) and M. B. Levin. *Amer Surg* 34(9):657-659, 1968.

151 A PHILOSOPHY OF TREATMENT OF ESOPHAGEAL CARCINOMA. *(E.)* Plested, W. G. VA Ctr., Los Angeles, Calif.), T. T. Tildon and R. K. Hughes. *mer Surg* 34(9):650-656, 1968.

152 A CASE OF SUBCORTICOSTERNAL DIAPHRAGMATIC (LARREY'S HERNIA) IN HILDHOOD. *(Hun.)* Baksa, J. (Semmelweiss Hosp., Miskolc, Hungary), J. Vincze and J. Danko. *Magyar Sebeszet* 21(4): 17-220, 1968.

153 CONGENITAL DIAPHRAGMATIC HERNIAS AND DIAPHRAGM ANOMALIES. *(Hun.)* Keszler, P. (John's Hosp., Budapest, Hungary) and E. Leitner. *Magyar Sebeszet* 21(4):209-216, 1968.

4154 SMOOTH-MUSCLE TUMOURS OF THE OESOPHAGUS. *(E.)* Deverall, P. B. (Gen. Infirm., Leeds, England). *Brit J Surg* 55(6):457-461, 1968.

4155 AN EVALUATION OF ESOPHAGEAL INTUBATION AS A PALLIATIVE MEASURE IN STENOSING CARCINOMAS OF THE ESOPHAGUS AND CARDIUM. *(Ger.)* Peiper, H. J. (Surg. Clin., Koln U., Germany) and J. Seiferth. *Bruns Beitr Klin Chir* 216(5):391-403, 1968.

4156 PRESTERNAL SEGMENTAL ESOPHAGOPLASTY IN CANCER OF THE THORACIC ESOPHAGUS. *(Rus.)* Filin, V. I. (S. M. Kirov Mil. Med. Inst., Leningrad, USSR). *Vestn Khir Grekov* (7):18-23, 1968.

4157 CARCINOMA IN A RECONSTRUCTED ESOPHAGUS. *(E.)* Bromberg, B. E. (Downstate Med. Ctr., Brooklyn, N. Y.), I. C. Song, A. Mishrick and R. Collins. *Ann Surg* 168(2):269-273, 1968.

4158 INTRAMURAL HEMATOMA OF THE ESOPHAGUS: AN UNUSUAL COMPLICATION OF VAGOTOMY. *(E.)* Rabiah, F. A. (St. Joseph Hosp., Flint, Mich.) and H. B. Elliott. *Amer J Dig Dis* 13(10):925-928, 1968.

4159 REPAIR OF HIATUS HERNIA BY INTRA-PERITONEAL GASTRIC FIXATION. *(E.)* Ramey, J. R. (Miami, Fla.). *Abdom Surg* 10(10):247-249, 1968.

4160 SPONTANEOUS RUPTURE OF THE ESOPHAGUS. *(E.)* Harrison, W. H. (U. Texas Med. Branch, Galveston) and J. R. Derrick. *Amer J Surg* 116(5):708-711, 1968.

4161 CONCURRENT, SYMPTOMATIC, SLIDING HIATAL HERNIA AND PARASTERNAL HERNIA (HERNIA OF MORGAGNI). [CASE REPORT] *(E.)* Bowles, T. (North Shore Hosp., Manhasset, N. Y.), N. Spier and L. Lester. *New York J Med* 68(4):576-578, 1968.

4162 ESOPHAGOPLEURAL FISTULA IN A NEW-BORN INFANT. *(E.)* Tolstedt, G. E. (221 N Fifth St., Bismarck, N. D.) and R. B. Tudor. *Arch Surg* 97(5): 780-781, 1968.

4163 PROSTHETIC REPLACEMENT OF ESOPHAGEAL SEGMENTS. *(E.)* LaGuerre, J. N. (Jewish Hosp. Med. Ctr., Brooklyn, New York City), H. Schoenfeld, W. Calem, F. E. Gould and B. S. Levowitz. *J Thorac Cardiovasc Surg* 56(5):674-682, 1968.

4164 ESOPHAGEAL FUNCTION AFTER SUCCESSFUL REPAIR OF ESOPHAGEAL ATRESIA AND TRACHEOESOPHAGEAL FISTULA: A MANOMETRIC AND CINEFLUOROGRAPHIC STUDY. *(E.)* Burgess, J. N. (Mayo Clin., Rochester, Minn.), H. C. Carlson and F. H. Ellis Jr. *J Thorac Cardiovasc Surg* 56(5):667-673, 1968.

4165 PEPTIC ESOPHAGITIS. *(Fr.)* Richard, C. A. (Beaujon Hosp., Paris, France), J. Mouiel, R. Giuli, J. Conte-Marti, C. Nihoul-Fékété, and P. Mitrofanoff. *Ann Chir* 22(11/12):745-752, 1968.

See also abstract nos.: 3797,3899,3900,3911,4598

STOMACH
(Gastric ulcer is placed with peptic ulcer)

4166 **BLOOD LIPID REDUCTIONS AFTER SUBTOTAL GASTRECTOMY.** *(E.)* Berkowitz, D. (Temple U. Sch. Med., Philadelphia, Pa.). *Amer J Gastroent* 50(2):95-106, 1968.

Pre- and serial postoperative blood lipid levels were compared in 10 patients with hyperlipemia and in 10 patients with normal blood lipid levels undergoing subtotal gastrectomy for peptic ulcer disease. All patients were studied for up to 4 yr after surgery. Prior to surgery each patient in the study group had an elevated cholesterol (mean = 318 mg%), elevated phospholipids (mean = 320 mg%), and 6 patients had hypertriglyceridemia (mean = 163 mg%). During the 4 yr follow-up in the study group, the cholesterol decreased in each patient with a decrease of 15% or more in 7 patients; normal values were attained in 5 patients. None of the patients in the control group showed significant changes. A decrease in phospholipids of at least 15% in 9 of the patients in the study group was noted, with no significant changes in the control group. A decrease in triglycerides of at least 20% in 6 of the study group patients was noted with significant reduction in 6 patients in the control group. The cause for the lowering of the blood lipids is probably related to disturbed fat absorptive processes following gastrectomy and to changes in the carbohydrate portion of the diet.

4167 **ANTIBODIES TO GASTRIN: THEIR PRODUCTION AND SIGNIFICANCE.** *(E.)* McGuigan, J. E. (Washington U. Sch. Med., St. Louis, Mo.). *Amer J Dig Dis* 13(9):847-849, 1968.

Antibodies to the functional portion of the gastrin molecule were prepared from rabbits by immunization with the carboxy-terminal tetrapeptide amide of gastrin covalently conjugated to carrier-protein molecules. Antibodies thus produced were found to bind equivalently on an equimolar basis the gastrin tetrapeptide, gastrin molecules, and the peptide hormone cholecystokinin-pancreozymin. Antibodies were also produced to human gastrin I. By radioiodine-immunoassay systems, greatly elevated levels of gastrin were found in the sera of patients with the Zollinger-Ellison syndrome as compared to that of controls. This affords strong evidence that gastrin is the circulating acid secretagogue in these patients. Gastrin antibodies will permit investigation of the structure-function relationships between gastrin and cholecystokinin-pancreozymin.

4168 **EFFECT OF ASPIRIN ON THE GASTRIC MUCOSA OF GUINEA PIGS ON A SCORBUTOGENIC DIET.** *(E.)* Russell, R. I. (Western Infirm., Glasgow, Scotland) and A. Goldberg. *Lancet* 11:606-608, 1968.

An investigation was made of the role of subclinical scurvy as a factor in maintaining hemorrhage precipitated by aspirin. It was found that guinea pigs on a scorbutogenic diet bled from the gastric mucosa significantly more often than those on a normal diet. The incidence of bleeding was increased with the addition of aspirin to the diet. It was concluded that these experimental findings together with clinical observations suggest that aspirin is more likely to cause significant gastric mucosal hemorrhage when subclinical scurvy is present.

4169 **CONGENITAL PYLORIC STENOSIS: ITS CLINICAL VARIATIONS.** *(E.)* Lobo, E. de H. (Alder Hey Children Hosp., Liverpool, England). *Practitioner* 201(1202):354-356, 1968.

Three case histories of congenital pyloric stenosis are presented illustrating late (at 6 months) onset, occurrence in the premature baby, and mimicry by other congenital abnormalities. In the case with late onset, vomiting associated with coughing and a cold appeared at 4 months. Six weeks later, a pyloric tumor was felt and gastric peristalsis seen. After barium-meal confirmation of pyloric stenosis, Ramstedt's operation was performed. In the premature baby, early diagnosis was impeded by consideration of complications associated with prematurity. After barium-meal demonstration of pyloric stenosis and a lax cardia sphincter, Ramstedt's operation was done. In the third case, a 5-yr-old girl presenting with abdominal pain and vomiting after every meal was found to have a palpable mass in the righ hypochondrium. A barium meal showed gross peristalsis, a filling defect in the pyloric antrum, and pyloric stenosis. The condition was corrected by resection of the lower stomach and upper duodenum and construction of a Billroth I gastroduodenostomy. The genetic incidence of congenital pyloric steno shows a male:female ratio of approximately 5:1, but the cond tion is not a sex-linked recessive trait. The condition is famili the relatives of female index patients having a higher risk of b ing affected. Surgical treatment (Ramstedt's operation) with adequate preoperative correction of dehydration and alkalosis gives very good results.

4170 **INFLUENCE OF GASTRIC EMPTYING-RATE AND OF INSULIN RESPONSE ON ORAL GLU COSE TOLERANCE IN THYROID DISEASE.** *(E.)* Holdsworth, C. D. (St. Bartholomew's Hosp., London, Englan and G. M. Besser. *Lancet* 2(7570):700-702, 1968.

Before treatment, the mean half-time for gastric emptying (measured in the supine position by the method of Griffith *et al* using $^{51}CrCl_3$) was 49 min in 12 patients with thyrotoxicosis (1 man and 11 women, 21-68 yr old) and 113 min in 9 women with primary hypothyroidism (18-64 yr old); 3-4 months after treatment (not specified), this had increased to 63 min in the hyperthyroid group (increases in 10 of 10 stud and had decreased to 68 min in the hypothyroid group (decreases in 8 of 9, moderate increase in 1 of 9). Hyperthyroidism was also associated with elevated peak blood-glucose and insulin levels, and some impairment of insulin response (2 patients were prediabetic), while hypothyroidism was associat with low blood glucose levels but normal levels for insulin. I is suggested that changes in gastric emptying-rate and insulin response may be at least partly responsible for the abnormalities in oral glucose tolerance frequently found in patients wit thyroid disease.

4171 **BONE FORMATION IN THE GASTRIC MUCOSA FOLLOWING SUBTOTAL GASTREC TOMY IN RATS.** *(E.)* Ackerman, N. B. (Boston U. Med. Ctr., U. Hosp., Mass.). *Exp Molec Path* 9(1):125-130, 1968.

Bone formation in the antral mucosa was observed in 24 of 37 Sprague-Dawley rats which had been subjected to subtotal gastrectomy (removal of the acid-secreting portion of the stomach) at the age of 2-3 months. The 24 rats included 5 of 17 receiving subtotal gastrectomy alone, 5 of 19 also given 0.02 N HCl as drinking water postoperatively, 14 of 47 also given methylcholanthrene (p.o. or s.c.), and 0 of 4 also given benzpyrene, but no bone formation was observed in any of 75 intact animals subjected to the same additional treatment or even to diversion of biliary flow through the stomach. Bone formation was seen as early as 46 days after surgery and persisted for as long as 671 days after gastrectomy. It was scattered in small foci in the mucosa of the glandular stomach, and was not localized to the anastomotic scar, although it was frequently situated within other areas of pathological change (fibrosarcoma, intestinal metaplasia, squamous metaplasia). It is suggested that bone formation results from the increased alkalinity of the stomach and possibly from unknown alterations in calcium and phosphorus metabolism.

4172 PHENYLBUTAZONE AND HISTAMINE FORMATION IN RAT GLANDULAR STOMACH: ITS RELATIONSHIP TO GASTRIC ULCERATION. *(E.)* Abdel-Galil, A. A. M. (Dept. Pharm. & Therap., U. Dundee, Scotland) and P. B. Marshall. *Brit J Pharmacol* 33(1):1-14, 1968.

The mechanisms by which phenylbutazone produces its ulcerogenic effects on the rat glandular stomach were investigated. Intramuscular administration of phenylbutazone (200 mg/kg) to female Wistar rats fasted overnight increased histamine formation and produced ulceration of the stomach; maximum effects were reached after 6 hr sodium salicylate and 2-(N'-methylpiperid-4'yl)4-benzyl, 5-phenyl-3-oxo-pyrazoline) produced a significant increase in histamine formation, but this was not associated with an increased ulceration index. The ulcerogenic effect of phenylbutazone was aggravated by fasting, adrenalectomy, hypophysectomy, simultaneous adrenelectomy and thyroidectomy, and simultaneous thyroidectomy and vagotomy. Vagotomy reduced the ulcerogenic effect of phenylbutazone in normal rats and adrenalectomized rats, but not in thyroidectomized rats. It is suggested that phenylbutazone has a depressant effect on the mucosal defensive factor of the rat gastric mucosa and that it also promotes aggressive factors, particularly the acid-pepsin factor.

4173 ABNORMALITIES IN IgA-CONTAINING MONONUCLEAR CELLS IN THE GASTRIC LESION OF PERNICIOUS ANEMIA. *(E.)* Odgers, R. J. (Dept. Med. U. Adelaide, S. Australia) and A. G. Wangel. *Lancet* 2(7573):846-849, 1968.

Evidence for an immunoglobulin disturbance in the gastric lesion of pernicious anemia was investigated. The sera of 20 patients with pernicious anemia, 6 control patients with duodenal ulcer, and 4 healthy controls were tested for circulating antibodies and immunoglobulin levels. Almost all patients had gastric secretion tests and all had gastric biopsies. Immunocytochemical studies were performed on the mucosal biopsy specimens. In the 10 controls, 8 had histologically normal gastric mucosa and 2 had mild, chronic gastritis. In the patients with pernicious anemia, 10 had gastric atrophy and 10 had chronic atrophic gastritis. In the biopsy specimens, from the controls, there was found a great preponderance of IgA-containing mononuclear cells with a ratio of IgA:IgG:IgM of 8:1:1.2. In 15 of the 20 patients with pernicious anemia, this ratio was 1:2:1. The remaining 5 patients had relatively normal ratios of immunoglobulin-containing cells. The 15 patients with the "atypical" ratio showed a 90% reduction in IgA mononuclear cells, a 15% increase in IgG cells, and a 50% reduction in IgM cells. All 20 of the pernicious anemia patients had higher concentrations of IgG than IgA in the gastric juice. No correlation was found between the immunoglobulin levels and the intrinsic factor content of gastric juice. The patients with "atypical" immunoglobulin ratios also had significantly lower serum IgG levels than the controls, but serum IgA and IgM levels did not differ significantly between the control and the study groups. In some pernicious anemia patients, the reduction in the number of IgA-containing mononuclear cells in the gastric mucosa may be a primary condition predisposing to gastric mucosal damage.

4174 GRAVITY GASTRIC COOLING DEVICE FOR MASSIVE UPPER GASTROINTESTINAL HEMORRHAGE, EMPLOYING WATER, ICE, AND AN IMPELLER PUMP. *(E.)* Lande, A. J. (U. Minnesota Med. Sch., Minneapolis), R. E. Edlich, W. P. Ritchie, R. L. Goodale and O. H. Wangensteen. *Surgery* 64(4):706-709, 1968.

To eliminate the hazards of overcooling, air accumulation, and balloon rupture that are associated with most gastric hypothermia machines, a cooling machine has been designed which utilizes gravity to feed ice-water from an overhead reservoir into an indwelling gastric balloon. During the continuous operation of the gravity inflow hypothermia assembly over two periods of 14 days each, balloon volumes remained constant, and no air accumulated within the system. The decrease in submucosal temperature (from 37C to 20C) achieved in 20 min with the conventional Swenko machine, which uses alcohol perfusion at a rate of 1100 ml/min, was achieved in 30 min with the new machine at a rate of only 400 ml/min, with increased safety and convenience. Attempts to produce a comparable temperature reduction by irrigating the stomach with iced saline were unsuccessful. In clinical studies with the new device on 11 patients with massive gastric hemorrhage which did not respond to iced-saline lavage or vasopressin, there was no evidence of overdistention of the balloon due to air leakage, nor of mechanical difficulties, and there was no need for constant supervision or regulatory operation of the machine by a physician.

4175 CONCERNING THE INCIDENCE OF "SPONTANEOUS" STOMACH CANCER IN *PRAOMYS (MASTOMYS) NATALENSIS.* *(E.)* Simmers, M. H. (California Coll. Med., Los Angeles), K. H. Ibsen and J. E. Berk. *Cancer Res* 28(8):1573-1576, 1968.

In order to resolve contradictory findings reported in the literature concerning the rarity of spontaneous gastrointestinal cancer in rodents, a colony of *Mastomys natalensis* was established based on a breeding stock of 19 8-month-old animals (5 males and 14 females) obtained from the Walter Reed Army Medical Center. The animals were housed in plastic cages and given Purina Laboratory Chow for rats and mice plus tap water *ad libitum.* The diet of breeding females was supplemented with sunflower seed to reduce cannibalism of the newborn. The eventual total of 60 animals (28 males and 32 females) was observed until death (14 cases) or sacrifice at the age of 7-27 months; 31 of the 60 animals reached the age of 18 months or older. Although an ovarian granulosa-cell tumor was discovered in a 14-month-old animal and a uterine endometrial adenocarcinoma was found in a 17-month-old animal, histological examination of the stomachs failed to reveal any gastric cancers. The forestomachs frequently showed hyperkeratosis, but no changes suggestive of precancer, and 52 of the 60 animals had 1-3 trichobezoars. The marked difference between these findings and the high incidence of gastric cancer previously reported in this same species and even in descendents of the same breeding stock is ascribed to an interaction between variations in genetically determined age susceptibility, endocrine factors, and the response to environmental carcinogens.

4176 JUXTACARDIAL GASTRIC DIVERTICULA AND THEIR SURGERY.

(E.) Tillander, H. (Ekman Hosp., Goteborg, Sweden) and R. Hesselsjo. *Acta Chir Scand* 134(3/4):255-263, 1968.

Case histories are presented for 7 patients (5 men and 2 women, 31-57 yr old at onset of symptoms, 36-59 yr old at surgery) with dorsally-located juxtacardial gastric diverticula ranging in size from that of a walnut to that of a tangerine. The patients complained of epigastric ulcer-like pain, dyspepsia, and postcibal or morning vomiting, but the final diagnosis was by X-ray. Surgery, using a technique developed by the authors, was performed in all 7 patients (excision in 6 cases and invagination in the other). All 7 patients were free of symptoms at follow-up 6 months to 5 yr postoperatively. The literature on the incidence, anatomy, symptoms, diagnosis, and treatment of juxtacardial gastric diverticula is reviewed (26 refs.), and it is concluded that these diverticula, which almost always require surgery, probably arise from a congenital defect in the muscular coat.

4177 ACCUMULATED EXPERIENCE WITH VAGOTOMY AND PYLOROPLASTY FOR SURGICAL CONTROL OF HEMORRHAGIC GASTRITIS.

(E.) Sullivan, R. C. (U. Colorado Sch. Med., Denver) and W. R. Waddell. *Amer J Surg* 116(5):745-749, 1968.

Among 30 patients (24 men and 6 women, 17-70 yr old) treated in Denver hospitals for hemorrhagic gastritis, 28 were given vagotomy and pyloroplasty while 2 had previously had a gastrectomy and were therefore only vagotomized. Gastritis was associated in most cases with alcoholism, cirrhosis (8 cases), duodenal ulcer or other conditions and was precipitated by alcohol (14 cases), aspirin (2 cases), steroids or stress. Preoperative requirements for blood ranged from 3 U/day to 16 U in 4 hr, and 25 of the 30 patients required surgery within 24 hr after admission. Only 2 of 12 preoperative upper gastrointestinal tract X-rays suggested the presence of gastritis. Of the 2 gastrectomized patients, one died in hepatic coma. Among the other 28, 4 had rebleeding 4-9 days postoperatively, 3 of 4 requiring transfusions and one of 4 requiring reoperation, but there were no deaths and no instances of late rebleeding among 15 patients followed for 3 months to 7 yr. Combining these figures with data in the literature yields 54 cases treated by vagotomy and pyloroplasty, of which 10 had rebleeding, 3 required reoperation, and 5 died (9%; 4 of hepatic failure or coma and 1 of pneumonia). In comparison, among 15 cases treated by vagotomy and antrectomy, only one had rebleeding and none required reoperation, but 3 died (20%; 2 of hepatic failure and 1 of unspecified causes). The lower rate of rebleeding probably does not justify the higher risk of postoperative mortality encountered with antrectomy as opposed to pyloroplasty.

4178 BLOOD LIPID REDUCTIONS AFTER SUBTOTAL GASTRECTOMY.

(E.) Berkowitz, D. (Temple U. Med. Sch., Philadelphia, Pa.). *Amer J Gastroent* 50(2):95-106, 1968.

Subtotal gastrectomy (50-75% removal) was performed for peptic ulcer disease in 10 patients with elevated blood lipids and in 10 patients with normal lipidemia, all followed for 4 yr All of the hyperlipemic patients had elevated cholesterol (mean 318 mg%) and phospholipid (mean 320 mg%) levels, and hypertriglyceridemia (more than 150 mg%) occurred in 6 of the 10. Postoperative results showed that the greatest decreases occurred in the triglyceride fraction (20% drop after 6 months and 27% after 1 yr). Maximal reductions occurred after 12 months and have persisted to date. Cholesterol levels decreased 15% or more in 7 of the hyperlipemic patients; a similar decrease was noted in triglyceride levels. Significant reductions in triglycerides were also noted in 7 of the control patients. Phospholipids decreased 15% in 9 of the hyperlipemic patients while insignificant changes occurred in the control group. The specific cause of the lowering of blood lipids in these patients is not clear, especially since weight loss was equal in both groups. It is most probably related to fat absorptive processes which are disturbed following gastrectomy. Qualitative as well as quantitative changes in the diet after surgery, particularly in the carbohydrate portion, may also be involved.

4179 AMINOSUGARS IN CASES OF GASTRIC ULCERS. II. THE ACTIVITY OF L-GLUTAMINE: D-FRUCTOSE-6-PHOSPHATE AMINOTRANSFERASE (E. C. 2.6.1.16) IN HUMAN GASTRIC MUCOUS MEMBRANE.

(E.) Zwierz, K. (Med. Sch., Bialystok, Poland), A. Gindzienski, J. Badurski and J. Popowicz. *Digestion* 1(3): 183-191, 1968.

The mucous membranes of human stomachs resected as a result of gastric ulcers were studied with reference to L-glutamin D-fructose-6-phosphate aminotransferase activity. This enzyme catalyzes the reaction between fructose-6-phosphate and L-glutamine to yield glucosamine-6-phosphate and glutamic acid. Aminotransferase activity in supernatants of mucous membrane homogenates centrifuged at 12,000 g for 60 min was determined photometrically with glucose-6-phosphate as the substrate. The enzyme activity was comparable to that found in pig gastric mucosa, which was the highest found in animal tissues investigated by the authors. The high enzyme activity in comparison with the high content of glucosamine and galactosamine seems to indicate a considerable intensification of the process of mucopolysaccharide biosynthesis in the gastric mucous membrane of stomachs with gastric ulcers.

180 **DISTURBANCES IN THE METABOLISM OF WATER AND ELECTROLYTES IN INFANTILE YPERTROPHIC PYLORIC STENOSIS.** *(Jap.)* Ando, T. Iihon U. Sch. Med., Tokyo, Japan). *Nichidai Igaku Z (Nihon niv Med J)* 27(4):476-508, 1968.

study was made of the pattern and severity of the water and ectrolyte imbalance in 46 cases of infantile hypertrophic py-ric stenosis. While most of the cases showed hypochloremic etabolic alkalosis with dehydration, there were some cases f hypokalemia and hyponatremia. Replacement therapy for ehydration and metabolic disturbances achieved successful re-lts in 1-3 days, after which time the patients were considered be in operable condition.

181 **CONTRACTION OF THE GASTRIC ANTRUM FOLLOWING A LONG-TERM GASTROENTER-STOMY: A REPORT OF TWO CASES.** *(E.)* Carter, T. L. Dept. Radiol., U. Michigan, Ann Arbor) and W. Martel. *adiology* 91(3):514-516, 1968.

wo cases (males, 24 and 57 yr old) are presented in which ntral contraction and atrophy followed gastroenterostomy. An wareness of this condition is considered of importance since he radiologic appearance of the antrum in these cases may be onfused with that of an infiltrating carcinoma, leading to a eedless laparotomy. It is also noted, however, that antral arcinoma may indeed develop in such cases. Differentiation etween these two conditions is usually possible through ra-liological and clinical diagnosis. In both cases presented, the nucosal margins were smooth and distinct and there was no vidence of diffuse mural thickening such as is characteristic of scirrhous carcinoma.

182 **A CRITICAL STUDY OF GASTRIC LAVAGE AS A METHOD OF EMPTYING THE STOMACH IN ACUTE POISONING IN CHILDREN.** *(Por.)* Schvartsman, S. (Fac. Med., U. Sao Paulo, Brazil) and F. A. Costa Vaz. *Rev Hosp Clin Fac Med S Paulo* 23(2):97-100, 1968.

4183 **EXFOLIATIVE CYTOLOGY IN THE DIAGNOSIS OF GASTRIC CANCER.** *(Rus.)* Bramberg, V. M. (Latvian Inst. Exp. Clin. Med., Riga). *Klin Lech Zlokach Novoobraz* (10):85-94, 1964.

4184 **THE PROBLEM OF EARLY DIAGNOSIS OF GASTRIC CANCER BY THE CYTOLOGICAL STUDY OF BIOPSY MATERIAL TAKEN DURING GASTROSCOPY.** *(Rus.)* Roshonok, M. P. (State Cancer Clinic, Ministry of Health Latvian SSSR, Riga). *Klin Lech Zlokach Novoobraz* (10):119-126, 1964.

4185 **GASTRIC AND DUODENAL CANCER OVER 30 YEARS BASED ON AUTOPSY DATA FROM THE 1ST RIGA MUNICIPAL CLINICAL HOSPITAL NO. 1 IN RIGA.** *(Rus.)* Kalinka, V. D. (1st Riga Munic. Clin. Hosp., Latvia). *Klin Lech Zlokach Novoobraz* (10):127-~~138, 1964.~~

4186 **THE TRAPPED AIR SIGN: ITS VALUE IN THE INTERPRETATION OF ANTRAL DEFORMITIES.** *(E.)* Lumsden, K. (U. Coll. Hosp., London, England) and J. H. W. Pexman. *Clin Radiol* 19(4):211-220, 1968.

4187 **BONE CHANGES FOLLOWING GASTRECTOMY.** *(E.)* Pridie, R. B. (London Hosp., England), P. M. Higgins and J. R. Yates. *Clin Radiol* 19(4):148-153, 1968.

4188 **ON THE CONSUMPTION OF UNBURNED TOBACCO IN PATIENTS WITH CANCER OF THE STOMACH.** *(E.)* Zacho, A. (Dept. Surg., Finsen Inst., Copenhagen, Denmark), J. Nielsen and V. Larsen. *Acta Chir Scand* 134(3-4):272-274, 1968.

4189 **CIRCULATORY CHANGES PROVOKED BY HYPERTONIC GLUCOSE SOLUTION BEFORE AND AFTER RE-OPERATION FOR DUMPING.** *(E.)* Bjuro, T. (U. Goteborg Dept. Clin. Physiol., Sweden) and E. Christoffersson. *Acta Chir Scand* 134(3-4):245-248, 1968.

4190 **ETHANOL AND STOMACH ULCERS: ABSENCE OF INFLUENCE IN THE ALBINO RAT.** *(E.)* Schmidt, K. M. (U. Santa Clara, Calif.) and F. D. Klopfer. *Quart J Stud Alcohol* 29(3):558-565, 1968.

4191 **NONCARCINOMATOUS TUMOURS OF THE STOMACH.** *(E.)* Beard, R. J. (St. George's Hosp., London, England), E. C. G. Lee, A. H. Haysom and D. H. Melcher. *Brit J Surg* 55(7):535-538, 1968.

4192 **THE LESSER CURVATURE OF THE STOMACH.** *(E.)* Lawson, H. H. (Dept. Surg., Johannesburg Gen. Hosp., S. Africa). *Brit J Surg* 55(8):625-627, 1968.

4193 **THE SINGLE GASTRIC POLYP.** *(E.)* Miln, D. C. (Glasgow Royal Infirm., Scotland) and G. Hannah. *Brit J Surg* 55(8):599-602, 1968.

4194 **A GASTRIC RECONSTRUCTION.** *(E.)* Self, J. B. (Leicester Gen. Hosp., London, England). *Brit J Surg* 55(8):602-604, 1968.

4195 **GASTROINTESTINAL ANASTOMOSIS WITH A SINGLE LAYER OF CONTINUOUS CATGUT.** *(E.)* Johnson, S. R. (Dept. Surg., Danderyd, Sweden). *Acta Chir Scand* 134(3-4):265-268, 1968.

4196 **MEDIASTINOSCOPY IN GASTRIC CARCINOMA.** *(E.)* Rydberg, B. (Dept. Surg. II, U. Goteborg, Gothenburg, Sweden). *Acta Chir Scand* 134(3-4):269-271, 1968.

4197 **CLINICAL AND RADIOLOGICAL FINDINGS IN THREE PATIENTS WITH VOLVULUS OF THE STOMACH.** *(It.)* Perra, L. (Radiol. Inst., U. Cagliari, Italy). *Radiol Prat* 17(5):535-555, 1967.

4198 **CAUSES AND INCIDENCE OF POSTOPERATIVE COMPLICATIONS FOLLOWING GASTRIC SURGERY.** *(Ger.)* Berghaus, H. (Essen Clin., Ruhr U., Germany), E. Müller and J. Löhnert. *Zbl Chir* 93(29):993-1000, 1968.

4199 **GASTRIC LEIOMYOBLASTOMA.** *(E.)* Herrington, J. L. Jr. (Vanderbilt Med. Ctr., Nashville, Tenn.). *Amer Surg* 34(9):681-686, 1968.

4200 **CONGENITAL PYLORIC STENOSIS: ITS CLINICAL VARIATIONS.** *(E.)* Lobo, E. H. (Alder Hey Children's Hosp., Liverpool, England). *Practitioner* 201(1202):354-356, 1968.

4201 **SUBNORMAL BODY WEIGHT FOLLOWING GASTRIC RESECTION.** *(Ger.)* Vetter, K. (Inst. Nutrit., German Acad. Sci., Potsdam-Rehbrucke, Germany). *Z Ges Inn Med* 23(12):181-183, 1968.

4202 **CARDIAC ULCERS IN PATIENTS WITH HIATUS HERNIA OF THE STOMACH.** *(Fr.)* Ledoux-Lebard, G. (Cochin U. Hosp. Ctr., Paris, France), G. Pallardy, Y. Laurent and D. Lallemand. *J Radiol Electr* 49(6/7):437-444, 1968.

4203 **INTERPOSITION OF SMALL INTESTINE FOLLOWING GASTRECTOMY: AN X-RAY ANALYSIS OF THE FUNCTION OF THE SO-CALLED SUBSTITUTE STOMACH.** *(Ger.)* Dux, A. (Inst. Roentgenol. Radiol., U. Bonn, Germany). *Z Kreislaufforsch* 5(1):1-17, 1968.

4204 **THE LONG-TERM MANAGEMENT OF POST-GASTRECTOMY PATIENTS.** *(Ger.)* Hotz, H. W. (Haldenstrasse 37a, Lucerne, Switzerland). *Schweiz Med Wschr* 98(28):1039-1043, 1968.

4205 **PYLORIC HYPERTROPHY IN THE ADULT: REVIEW OF 3 CASES.** *(Sp.)* Marquez Reveron, A. M. (Med. Fac., Cent. U. Venezuela, Caracas) and S. Beker G. *GEN* 22(3):245-267, 1968.

4206 **BREAST CARCINOMA METASTATIC TO THE STOMACH: REPORT OF A CASE IN A MALE AND REVIEW OF AN AUTOPSY SERIES.** *(E.)* Davis, H. L. Jr (U. Wisconsin Hosp., Madison), R. K. Murray and B. C. Korbitz. *Amer J Dig Dis* 13(10):868-873, 1968.

4207 **CONGENITAL ANTRAL MEMBRANE.** *(E.)* Parrish, R. A. (Eugene Talmadge Mem. Hosp., Augusta, Ga.), C. B. Kanavage, J. A. Wells and W. H. Moretz. *Surg Gynec Obstet* 127(5):999-1004, 1968.

4208 **DELAYED CAUSES OF DEATH FOLLOWING BILLROTH II GASTRIC RESECTION.** *(Ger.)* Mörl, H. (St. Georg Hosp., Leipzig, Germany). *Med Klin* 62(49):1904-1907, 1967.

4209 **CAUSES OF EARLY DEATH FOLLOWING BILLROTH II GASTRIC RESECTION.** *(Ger.)* Mörl, H. (St. Georg Hosp., Leipzig, Germany). *Med Klin* 62(48):1861-1864, 1967.

4210 **GASTRIC RESECTION AND CRIMINAL BEHAVIOR.** *(Ger.)* Boller, R. (Gen. Hosp., Vienna, Austria) and W. Doleisch. *Med Klin* 62(49):1908-1913, 1967.

4211 **INFANTILE PYLORIC STENOSIS: EXPERIENCE WITH 305 CASES AT LOUISVILLE CHILDREN'S HOSPITAL.** *(E.)* Bell, M. J. (U. Louisville Hosp Ky.). *Surgery* 64(5):983-989, 1968.

4212 **MASSIVE BLEEDING IN A NEWBORN INFANT FROM A GASTRIC ULCER ASSOCIATED WITH HYPERTROPHIC PYLORIC STENOSIS.** *(E.)* Kelsey, D. (Jefferson Med. Coll., Philadelphia, Pa.), J. W. Stayman Jr., E. D. McLaughlin and W. Mebane. *Surgery* 64(5):979-982, 1968.

4213 **STUDY OF GASTRIC SECRETION, VITAMIN B_{12} ABSORPTION AND INTRINSIC FACTOR SECRETION AS RELATED TO HISTOPATHOLOGICAL CHANGES IN GASTRIC MUCOSA.** *(It.)* Fiore, E., F. Possati and M. L. Ricci Bitti. *Clinica* 27(5):384-396, 1968.

4214 **A HISTOLOGICAL STUDY OF CHRONIC GASTRITIS IN KOREA.** *(Kor.)* Chung, K. S. (Sch. Med. Kyungpook Natl. U., Korea) and S. J. Hong. *J Korean Med Ass* 11(5):403-427, 1968.

4215 **CYTOCHEMICAL STUDIES ON GASTRIC SMEAR.** *(E.)* Akagi, M. (Kumamoto U. Med. Sch., Japan), H. Motoyama, A. Misumi, A. Kuwano, K. Asoo, M. Ikeda and T. Ikeda. *Kumamoto Med J* 21(2):66-75, 1968.

4216 **AN EXPERIMENTAL STUDY ON GASTRIC FREEZING, WITH PARTICULAR ATTENTION TO EFFECTS ON GASTRIC SECRETION IN DOGS AND HUMANS.** *(Jap.)* Murai, M. (Iwate Med. U., Japan). *Arch Jap Chir* 37(5):673-687, 1968.

4217 **HYPERTROPHIC PYLORIC STENOSIS IN THE ADULT.** *(E.)* Schwartz, H. F. (Wayne, N. J.). *J Abdom Surg* 10(11):275-277, 1968.

4218 **CONGENITAL VASCULAR MALFORMATION ("CALIBRE-PERSISTENCE") AS A PATHOGENIC FACTOR OF LETHAL GASTRIC HAEMORRHAGE.** *(E.)* Krasznai, G. (U. Med. Sch., Debrecen, Hungary) and V. Szokoly. *Acta Chir Acad Sci Hung* 9(2):137-142, 1968.

4219 **OSTEOMALACIA AND OSTEOPOROSIS.** *(E.)* Morgan, D. B. (U. Leeds, England). *Postgrad Med J* 44(514):621-625, 1968.

220 MASSIVE BLEEDING OF THE UPPER-GASTROINTESTINAL TRACT DUE TO DIEULAFOY'S
.OSION. *(E.)* Rossi, N. P. (Dept. Surg., U. Iowa, Iowa City),
W. Green and J. D. Pike. *Arch Surg* 97(5):797-800, 1968.

221 STUDIES IN THE ABSORPTION AND METABOLISM OF VITAMIN D AFTER GASTRIC
JRGERY. *(E.)* Thompson, G. R. (Royal Postgrad. Med. Sch.,
ondon, England). *Postgrad Med J* 44(514):626-628, 1968.

222 THE RADIOLOGIC PICTURE OF EARLY COMPLICATIONS AFTER GASTRECTOMY.
.) Benendo-Kapuscinska, B. (Dept. Med. Radiol., Med. Acad.,
arsaw, Poland). *Pol Rev Radiol Nucl Med* 31(5):704-709,
)67.

4223 SEVERAL NEW APPROACHES TO THE EARLY DETECTION OF STOMACH CANCER. *(Rus.)* Braines, S. N. (A. V. Vishnevskii Inst. Surg., Acad. Med. Sci., Moscow, USSR) and Iu. G. Shaposhnikova. *Sovet Med* (7):106-111, 1968.

4224 GASTRIC pH RADIOMETRY AS A MEANS OF STUDYING THE SEQUELAE OF GASTRIC RESECTION. *(Fr.)* Campana, F. P. (Inst. Surg. Symptomatol., U. Rome, Italy), L. Gioffre, C. Zambianchi and F. Zechini. *Ann Chir* 22(11/12):773-779, 1968.

4225 TRAUMATIC RUPTURE OF AN EXOGASTRIC LEIOMYOSARCOMA. *(E.)* Richter, R. M. (The Jewish Hosp. Med. Ctr. Brooklyn, N. Y.). *Amer J Gastroent* 50(2):144-147, 1968.

See also abstract nos.: 3887,3889,3890,3907,3921

4226 A BIOPSY STUDY OF THE MESENTERIC SMALL INTESTINE IN SCLERODERMA. *(It.)* Gasbarrini, G. (Inst. Spec. Med. Path., U. Bologna, Italy), N. Melchionda, S. Casanova and B. A. Mantovani. *G Clin Med* 49(2):176-200, 1968.

Light and electron microscopy of biopsy specimens taken from the small intestine of 5 fasting patients (1 man and 4 women) with scleroderma (2 of the 5 having radiologically demonstrable lesions in the small intestine) revealed significant ultrastructural changes in all cases. Conventional histological studies revealed a decrease in height of some of the villous epithelial cells, slight atrophy of the crypts, numerous mucoid cells filled with homogeneous mucus, and marked infiltration by lymphocytes, plasmocytes, eosinophilic leukocytes and histiocytes containing coarse granules of phagocytosed material. Electron microscopy revealed changes in the filamentous substance of the microvilli, a peculiar fine granularity in the cytoplasm of the epithelial cells, a few cells (those which were reduced in height) with swollen mitochondria and coarse multilobular bodies, chromatin condensation in the periphery of the nuclei, large intercellular spaces in the basal epithelium with infiltrating cells showing cytoplasmic fragmentation, and (most characteristically) marked thinning of the basement membranes of the epithelium and capillaries, with almost complete substitution of the protofilaments by a network of collagen fibers. The significance of these findings for the pathogenesis of scleroderma remains unclear.

4227 JEJUNAL HETERO-β-GALACTOSIDASE ACTIVITIES IN UGANDANS WITH LACTASE DEFICIENCY. *(E.)* Cook, G. C. (U. Lund, Sweden) and A. Dahlqvist. *Gastroenterology* 55(3):328-332, 1968.

A study was made of jejunal activities of disaccharidase at pH 6.0, hetero-β-galactosidase at neutral and acid pH in 12 Ugandan patients from Bantu tribes and 6 from Hamitic tribes. Measurement of lactase activity showed the Bantu subjects to have low levels while those of the Hamitic subjects were normal. While the other disaccharidases had normal activity in the Bantu, their hetero-β-galactosidase activities were also significantly depressed. These findings were said to support the concept that the human jejunum contains two β-galactosidases: a brush border lactase with weak hetero-β-galactosidase activity, which is absent in the Bantu, and a nonspecific β-galactosidase which hydrolyzes hetero-β-galactosides at about the same rate as lactose.

4228 THE VARIOUS PATTERNS OF INTESTINAL ATRESIA. *(E.)* Spencer, R. (Louisiana State U. Med. Ctr., New Orleans). *Surgery* 64(3):661-668, 1968.

The mortality rate, birth weight, age at operation, and presence of other anomalies were correlated with the level, type, and degree of congenital intestinal obstruction in 53 cases. Incidence of atresia varied with the level of bowel involved. Single obstructions were most common in the duodenum while multiple obstructions and those secondary to volvulus and intussusception occurred most often in the jejunum and ileum. A correlation was found between the height of the obstruction, incidence of prematurity, incidence of multiple anomalies, incidence of single, simple obstructions, and the mortality rate.

4229 PROTEIN STARVATION AND THE SMALL INTESTINE: II. DISACCHARIDASE ACTIVITIES. *(E.)* Prosper, J. (U. Colorado Med. Ctr., Denver), R. L. Murray and F. Kern Jr. *Gastroenterology* 55(2):223-118, 1968.

A study was made of the effects of protein deprivation on small intestinal disaccharidase activities of young rats in two experiments. In one the rats were fed a protein-free diet ad libitum for 45 days, and in the other they were force fed a protein-free diet for a shorter period. After sacrifice the small intestine was divided into segments and mucosal disaccharidase activities were determined. It was found that while a protein-free diet caused the rats to lose weight and strength, there was no significant decrease in the activity of the intestinal mucosal disaccharidases, lactase, sucrase, and maltase. Tl small intestine of the protein-deprived rats was small, short, and thin. The jejunal mucosa showed minor changes by light microscopy, but the fine structure was normal. The locus of the disaccharidases, the brush border, was intact and appeared normal. The ileum was atrophic, but there were no electron microscopic abnormalities.

4230 JEJUNAL MUCOSAL DIGESTION OF GLUTEN PEPTIDES IN ADULT COELIAC DISEASE. *(E.)* Douglas, A. P. (Royal Postgrad. Med. Sch., London, England) and C. C. Booth. *Lancet* 2(7566):491-492, 1968.

Ten patients with untreated celiac disease and 7 other patient who had been on a strict gluten-free diet for 1 year or more, along with 10 control patients (no malabsorptive disease), wer studied. A Crosby capsule was used to obtain jejunal mucosa; a small portion of each specimen was examined histologically and the rest was frozen in liquid nitrogen and stored at -25C until processed. Each specimen was homogenized and prepare at 4C; protein content was estimated by the Lowry method. The mucosal homogenate was mixed at 37C for 1 hr with equ volumes of peptide solution (prepared from wheat gluten digested by pepsin and trypsin, adjusted to pH 6.5, and contain ing 700 μM/ml nitrogen). Then hydrolysis was terminated an the mixture centrifuged. The supernatant was deproteinized and analyzed for amino acids by ion-exchange chromatograph The results confirm the lack of peptidase activity in untreated celiac mucosa in celiac disease, but show that this impaired ability to digest a gluten-peptide solution does not persist afte successful treatment. The ability to release amino acids from gluten peptides returns to normal in treated celiac disease. the height of the obstruction, incidence of prematurity, incidence of multiple anomalies, incidence of single, simple obstructions, and the mortality rate.

4231 EXPERIMENTAL OBSERVATIONS ON DUODENAL CYTOLOGY. *(Ger.)* Ritter, U. (Med. Acad., Lubeck, Germany). *Z Gastroent* 6(3):175-180, 1968.

Several hundred specimens of duodenal fluid obtained from experimental animals and human subjects under varying conditions, as well as intestinal biopsy specimens, were studied ir ler to facilitate the differentiation between epithelial and nulocytic elements in the duodenal fluid after storage and/or ining and thus enhance the diagnostic interpretation of the ults of duodenal cytology. The most characteristic finding fasting duodenal fluid from man or animals is the extreme iability of cell form and number, going from readily recog- able cylindrical epithelial cells and goblet cells to various nsitional types of necrotic border cells and leukocytes which idly lose their characteristic structure due to autolysis. Il- trations of some clearly identifiable cell types obtained by eated irrigation of the duodenum are provided. It is em- asized that duodenal cytology can yield valuable results in ny cases (of digestive tract cancer, for example) which might missed by direct biopsy, but that rapid processing of the nple is essential to prevent complete loss of the characteristic rphology and histochemistry of the various cell types. The e and degree of necrobiosis of exfoliated intestinal cells ems to depend on the pH, proteolytic activity, and physico- emical properties of the intestinal fluid.

232 **WIND SOCK WEB OF THE DUODENUM.** *(E.)* Rowe, M. I. (Children's Hosp., Columbus, Ohio), . Buckner and H. W. Clatworthy Jr. *Amer J Surg* 116(3): 44-449, 1968.

ommon pitfalls in the diagnosis and management of wind- ck webs of the duodenum are discussed on the basis of perience with 10 newborn infants (4 boys and 6 girls, 5 hr 8 days old) seen during the period 1949-65, 6 of whom rvived (including one with a double web). Of the 11 webs, were proximal to the ampulla of Vater and 7 were distal; hile 5 were imperforate, 6 had small apertures. Nine of the 0 infants had multiple congenital anomalies. The principal roblems in such cases are caused by the presence of other bstructive intestinal lesions (found in 5 infants), incomplete otation of the gastrointestinal tract (found in 6 cases), the natomy of the web itself, and situs inversus (3 cases). A narkedly dilated duodenum, or persistent vomiting following elief of intestinal obstruction, should suggest a web or some ther form of high intestinal obstruction. The duodenal web s a flexible, transparent, occasionally perforate diaphragm that eadily falls away from an exploring instrument passed through duodenotomy and is frequently overlooked by the surgeon. The center of the web is usually pushed down the lumen of he bowel into the area of caliber change, above which an in- cision will miss the point of attachment of the web. Diag- nosis can be made with plain, upright films of the infant, taken to include the chest and abdomen. Contrast examination and barium enema are suggested preoperative procedures. During surgery, identification of a duodenal web is accomplished by passing a stiff catheter through a gastrostomy and into the duodenum. Pressure on such a catheter causes invagination of the duodenal wall at the point of origin of the web. A duodenostomy just below the point of origin will permit identification and excision of the web.

4233 **AMPULLARY OBSTRUCTION BY BENIGN DUODENAL POLYPS.** *(E.)* Griffin, W. O. Jr. (U. Kentucky Coll. Med., Lexington), J. W. Schaefer, S. Schindler, G. Hyde and L. R. Bryant. *Arch Surg* 97:444-449, 1968.

Histories are presented for patients (2 men and 3 women, 47-69 yr old) with preampullary polyps associated with pancreaticobiliary obstruction. Two patients had symptoms typical of biliary colic but X-ray findings were negative. Hypotonic duodenography provided the preoperative diagnosis in 1 patient. Only one of the patients had biliary tract stones. Local excision combined with sphincteroplasty was the procedure of choice and was performed in 4 patients with complete cure. One patient underwent an unnecessary pancreaticoduodenectomy due to an erroneous reading of low-grade malignancy on frozen section. The polypoid lesions in all 5 patients had associated inflammation at the base and may represent a variant of papillitis. Prognosis in this type of patient is excellent.

4234 **INTESTINAL MUCOSA IN CYSTINOSIS: A FINE STRUCTURE STUDY.** *(E.)* Morecki, R. (Montefiore Hosp. Med. Ctr., Bronx, New York City), L. Paunier and J. R. Hamilton. *Arch Path* 86(3):297-307, 1968.

4235 **GALLSTONE FRAGMENTATION; A CONTRIBUTION TO GALLSTONE ILEUS.** *(Ger.)* Georgy, H. U. and H. Hillger. *Med Welt* 19(32):1723-1726, 1968.

4236 **ASCARIS LUMBRICOIDES INFESTATION ASSOCIATED WITH JEJUNAL MUCOSAL ABNORMALITIES.** *(E.)* Maxwell, J. D. (Royal Infirm., Glasgow, Scotland), D. Murray, A. Ferguson and E. Calder. *Scot Med J* 13(8):280-281, 1968.

4237 **DUODENAL DIVERTICULA THEIR SIGNIFICANCE IN BILIARY TRACT DISEASE.** *(E.)* Lutz, J. E. (Detroit, Mich.). *Harper Hosp Bull* 26(3): 123-128, 1968.

4238 **SMALL BOWEL EROSION AFTER AORTIC REPLACEMENT BY SYNTHETIC GRAFT.** *(E.)* Dass, T. (Highland Hosp., Rochester, New York). *Amer J Surg* 116(3):460-462, 1968.

4239 **AN AUTOPSY CASE OF PAPULOSE ATROPHIANTE MALIGNE: THE FIRST CASE IN JAPAN.** *(E.)* Ogawa, K. (Okayama U. Med. Sch., Japan), M. Ohmori, S. Kobayashi, N. Nohara and M. Takenaka. *Acta Path Jap* 17(4):457-463, 1967.

4240 **MASSIVE RESECTION OF SMALL BOWEL.** *(E.)* Scott, D. F. (Alfred Hosp., Melbourne, Australia). *Aust New Zeal J Surg* 38(1):26-29, 1968.

4241 **INFECTIONS DURING GASTRODUODENAL SURGERY.** *(Sp.)* Solis, J. (Natl. Inst. Nutrit., Mexico City), J. Ruiloba, L. Soler and J. Merino. *Gac Med Mex* 98(6):715-720, 1968

4242 **NUTRITION AND ABSORPTION AFTER RESECTIONS AND BYPASS-OPERATIONS ON THE SMALL INTESTINE IN RATS: THE EFFECT OF DIFFERENT TYPES OF ANASTOMOSIS.** *(E.)* Nygaard, K. (U. Inst. Forensic Med., Oslow, Norway). *Acta Chir Scand* 134(1): 63-78, 1968.

4243 **DUODENAL OBSTRUCTION IN INFANTS AND CHILDREN. [REPORT OF CASES]** *(E.)* Bush, A. K. (Myers Clinic, Philippi, W. Va.). *W Virginia Med J* 64(9): 339-349, 1968.

4244 **PRIMARY CARCINOMA OF THE INFRAPAPILLARY DUODENUM.** *(Ger.)* Hentschel, M. (Surg. Clin., Free U. Berlin, Germany), P. Körtge and K. W. Schondorf. *Deutsch Med Wschr* 93(30):1433-1436, 1968.

4245 **NONSPECIFIC ULCERS OF THE SMALL INTESTINE.** *(Rus.)* Kletskin, S. Z. (3d Munic. Hosp., Pavlovskii Posad, USSR) and B. A. Berdinskikh. *Vestn Khir Grekov* (7):46-49, 1968.

4246 **MALIGNANT LESIONS OF THE SMALL INTESTINE: A TEN-YEAR SURVEY.** *(E.)* Brookes, V. S. (United Birmingham Hosp., England), J. A. H. Waterhouse and D. J. Powell. *Brit J Surg* 55(6):405-410, 1968.

4247 **OPERATIVE DECOMPRESSION OF DISTENDED SMALL INTESTINE.** *(E.)* Ibach, E. G. (Dept. Surg. U. Western Australia). *Med J Aust* 1(8): 304-307, 1968.

4248 **SELECTIVE PORTAL HYPERTENSION WITH ISOLATED DUODENOJEJUNAL VARICES. [CASE REPORT]** *(E.)* Rosen, H. (Harvard Med. Sch., Boston, Mass.), W. Silen and M. Simon. *New Eng J Med* 277(22):1188-1190, 1967.

4249 **METABOLIC EFFECTS OF SMALL BOWEL REVERSAL IN TREATMENT OF THE SHORT BOWEL SYNDROME.** *(E.)* Wilmore, D. W. (U. Pennsylvania Hosp., Philadelphia) and C. J. Johnson. *Arch Surg* 97(5):784-791, 1968.

4250 **SMALL INTESTINAL NEUROFIBROMATOSIS WITH GASTROINTESTINAL HEMORRHAGE AND OVARIAN TUMOR.** *(E.)* Lahiri, T. K. (Newark, N. J. *J Newark Beth Israel Hosp* 19(8):12-19, 1968.

4251 **SMALL INTESTINAL TUMORS AT OUR CLIN** *(Hun.)* Tasnady, L. and B. Kiss. *Magy Onkol* 22(2):76-83, 1968.

4252 **HYPEROSMOLAR DIABETIC COMA ACCOMPANIED BY SMALL BOWEL NECROSIS WITH PATENT MESENTERIC ARTERIES.** *(Pol.)* Dyk, T. (3d Int Med. Clin., Acad. Med., Gdansk, Poland) and J. Pietruszewska Cichowicz. *Pol Tyg Lek* 23(35):1321-1322, 1968.

4253 **CHANGES IN THE MUCOSAL DIGESTION IN VARIOUS SEGMENTS OF THE SMALL INTESTINE OF RATS AFTER TOTAL X-RAY IRRADIATI** *(Rus.)* Bulbuk, G. A. (Cent. Res. Roentgen-Radiol. Inst., Leningrad, USSR). *Biull Eksp Biol Med* 66(7):42-45, 1968.

4254 **TRAUMATIC INTRAMURAL HAEMATOMA O THE DUODENUM.** *(E.)* Crowley, J. G. (Charitable Infirm. Jervis St., Dublin, Ireland) and P. G. Colli *J Irish Med Ass* 61(374):285-287, 1968.

See also abstract no.: 3674

55 **INCIDENCE OF PEPTIC ULCER COMPLICATIONS, THEIR RELATION TO CLIMATE AND GE.** *(E.)* Berg, M. (Michael Reese Hosp., Chicago, Ill.), M. usig, H. Heath and H. Necheles. *Amer J Gastroent* 50(2): 7-115, 1968.

review was made of 345 cases of gastric and duodenal ulcer spitalized for hemorrhage and/or perforation to see if these mplications of peptic ulcer could be correlated with age and matic changes such as barometric pressure, temperature, passe of warm and cold fronts and months or seasons. It was und that while no statistically significant seasonal or monthly riations were noted, duodenal ulcer cases under 50 years of e showed statistically significant chi square values when the se incidence and the days of rising or decreasing barometric essure were compared. It was noted that other factors other an climatic or seasonal must be considered in the pathogenesis f perforation and hemorrhage in peptic ulcer disease, such as ypertensive cardiovascular disease, stress, overwork, infections, iet, alcohol and weight loss.

256 **EFFECT OF ATROPINE ON GASTRIC ACID RESPONSE TO GRADED DOSES OF PENTA-ASTRIN AND HISTAMINE IN DUODENAL ULCER ATIENTS BEFORE AND AFTER VAGOTOMY.** *(E.)* onturek, S. J. (Med. Sch., Krakow, Poland), J. Oleksy and . Wysocki. *Amer J Dig Dis* 13(9):792-800, 1968.

he gastric acid secretion was examined in 20 duodenal ulcer atients with intact vagi and in 12 after surgical vagotomy. he secretions measured were basal and Pentagastrin or histamine - stimulated levels before and after administration of arious doses of atropine. It was found that atropine caused a epression of basal acid output and lowered the dose response curves to Pentagastrin and histamine, causing them to shift to the right. A dose of 25 μg/kg/hr of atropine resulted in maximum inhibition of basal and stimulated acid secretion. While the maximal acid output remained unchanged both in patients with intact vagi and after surgical vagotomy, significant inhibition of acid output was observed in basal secretion and at lower dose levels of gastric stimulation.

4257 **STOMACH ULCER AND DUODENAL ULCER RUNNING A FATAL COURSE DURING STEROID TREATMENT.** *(E.)* Groth, A. (St. Elisabeth's Hosp., Copenhagen, Denmark), K. Groth and J. Mosbech. *Acta Med Scand* 183(6):573-576, 1968.

A review was made of 51 cases of fatal gastroduodenal ulcers which occurred during steroid treatment. This number represented 3.5% of all lethal ulcer cases in the reporting period. The group studied consisted of 18 males and 33 females with an average age of 65. Over 50% were suffering from rheumatoid arthritis and were receiving 15 to 20 mg of daily steroid therapy over a period of several years. The ulcers were found to be large and most frequently located in the stomach, many without fibrosis. No definite correlation was found between the characteristics of the ulcers and the dose and duration of the steroid treatment. It was noted that irrespective of steroid treatment, patients with rheumatoid arthritis present a higher incidence of ulcers which increase with the prolonged duration of the disease and the severity of the illness. Thus, since those patients with severe rheumatoid arthritis usually have a high risk of ulcer development, and are usually treated with steroid, evaluation of the ulcer is difficult.

4258 **ACID OUTPUT ON HISTAMINE–INFUSION TEST IN DUODENAL ULCER PATIENTS.** *(E.)* Desai, H. G. (Tata Mem. Hosp., Parel, Bombay, India), A. V. Borkar and K. N. Jeejeebhoy. *Digestion* 1(2):115-119, 1968.

Results of the histamine-infusion test were compared in 60 male duodenal-ulcer patients (mean age 36.0 yr) and 40 male controls (mean age 34.5 yr), all residents of Bombay, India. The maximal gastric secretion, basal acid output, and maximal histamine response, resp., were 131-355 (mean 262) ml/hr, 3.7 ± 2.71 mEq/hr and 22.8 ± 5.24 mEq/hr in controls, compared to 161-478 (mean 285), 5.6 ± 3.54 mEq/hr, and 32.8 ± 12.5 mEq/hr in the patients. About 45% of the patients with duodenal ulcer showed a significantly higher acid output than the mean output in control subjects. However, male patients with duodenal ulcer from India showed a significantly lower acid output than those reported in Britain, Denmark and America. The possible causes of these output differences are discussed.

4259 **EFFECT ON THE INTESTINAL BACTERIAL FLORA ON ACUTE GASTRIC STRESS ULCERATION.** *(E.)* Rosoff, C. B. (Harvard Med. Sch., Boston, Mass.) and H. Goldman. *Gastroenterology* 55(2):212-222, 1968.

Acute gastric ulceration which follows restraint stress in rats was prevented by the oral administration of polymyxin B. The reduction of coliform bacteria and their growth products in the intestine resulted in a decrease of the motor tone of the stomach and cecum, and a lowering of the volume and concentration of gastric acid produced in response to stress. Administration of endotoxin eliminated the beneficial effect of polymyxin B in antibiotic-treated animals and caused increased gastric acid production and the incidence of stress ulceration in the animals with normal flora. It is suggested that the bacterial products cause mucosal injury through a central activity rather than a local one. This is supported by the fact that both vagotomy and anticholinergics prevent the gastric acid response and the resulting mucosal injury which are induced by restraint and endotoxin.

4260 **OUR EXPERIENCE WITH VAGOTOMY FOR DUODENAL ULCERS.** *(Fr.)* Grosdidier, J. (Region. Hosp. Ctr., Nancy, France) and D. Robert. *Acta Gastroent Belg* 31(4/5):245-254, 1968.

Among 684 duodenal ulcer patients (633 men and 51 women, 16-79 yr old but 51% between 29 and 49) treated by total bilateral vagotomy during the period 1948-67, the mortality (4-15 days postoperative) was 1.6% and another 7.9% had postoperative complications (intestinal transit disorders, thromboembolism, atelectasis, hemorrhage, subphrenic abscess, etc.). In 90.5% of all cases the operation was thus safe and uncomplicated. The mean hospital stay after surgery was only 7-9 days. Vagotomy was supplemented by gastroenterostomy in

522 cases and by pyloroplasty in 132 (mostly more recent cases), and only 8 had no drainage procedure of any type. The duration of peptic ulcer disease at the time of surgery was 4 yr or more in 59.9%, but was less than 1 yr in 54 cases, including 11 operated on under emergency conditions (8 because of hemorrhage and 3 because of perforation). Previous perforations had been noted in 87 cases (up to 5 yr earlier, but 27 of the 87 were operated on as emergencies), previous bleeding in 135 (13 of which came to emergency surgery), and stenosis or prestenosis in 93. Among the 461 cases that could be followed, 84% had good-very good results, 12% had average results, and 4% had poor results, including 12 cases (2.5%) of recurrent ulcer. These results can be compared with those in 88 patients treated during an earlier period by Polya gastrectomy: 75% good-very good, 15% average, and 10% poor, with 1% recurrent ulcers.

4261 A PRELIMINARY REPORT ON POSTOPERATIVE MORTALITY AND MORBIDITY FOLLOWING SUBDIAPHRAGMATIC VAGOTOMY FOR UNCOMPLICATED DUODENAL ULCERS.

(Fr.) Hollender, L. F. (8 Rue de l'Universite, Strasbourg, France), G. Sava and A. G. Weiss. *Acta Gastroent Belg* 31(4/5):255-266, 1968.

The complications encountered during and within 4 weeks after total subdiaphragmatic vagotomy are reviewed on the basis of published data and 340 personal cases treated for simple duodenal ulcer in an 11-yr period. In this series, there was only one postoperative death, yielding a mortality rate of 0.29% compared to published rates of 0-1.6% for vagotomy and gastroenterostomy, 0.5-1.7% for vagotomy and pyloroplasty, 0-3.1% for vagotomy and antropylorectomy, and 3-6% for duodenogastrectomy. Perforation of the esophagus, intra-abdominal hemorrhage, and cardiac complications such as arrest or infarction are rarely encountered during the operation (no personal cases). The only severe postoperative complication encountered personally was one case of severe diarrhea, although reports in the literature also mention gastroplegia (gastrointestinal atonia, hypersecretion, and collapse) and intestinal occlusion. Many of the severe complications (such as pancreatic, biliary or duodenal fistulas) seen after gastrectomy are never seen after vagotomy. Minor complications include: recurrent bleeding from the ulcer (3 personal cases), delayed evacuation of gas, dysphagia and cardiospasm (in 5.5%), hiccough, dyspepsia (in 20.2%), inflammation of the pylorus or the anastomosis (in 1.2%), the dumping syndrome (in 0-2.8% according to reports in the literature), diarrhea (in 8%), endothoracic visceral spasm or bronchospasm, and pleural effusion. The diagnosis, prevention and treatment of each of these complications are discussed, and it is pointed out that both the incidence and the severity of postoperative complications are much lower after vagotomy than after traditional gastric resection.

4262 MORTALITY AND COMPLICATIONS FOLLOWING VAGOTOMY FOR PERFORATED AND BLEEDING ULCERS.

(Fr.) Derom, F. (Acad. Hosp., U. Ghent, Belgium). *Acta Gastroent Belg* 31(4/5):267-280, 1968.

Based on a detailed review of the literature (68 refs.) and personal experience with 148 cases treated by vagotomy and drainage for bleeding or perforated peptic ulcers, vagotomy and pyloroplasty is concluded to be the procedure of choice in these emergency situations, combined with ligation of the bleeding artery in the case of acute hemorrhage. In patients in good condition, pyloroplasty can be replaced by antrectomy, which reduces the incidence of recurrent bleeding still further. The mortality from either of these procedures is much lower than that after gastrectomy. Among 15 patients recently subjected to emergency vagotomy and pyloroplasty for bleeding duodenal ulcers, for example, only one died (infarction 3 days postoperatively) and one had a recurrent hemorrhage 6 days postoperatively. Among 72 patients recently treated for perforated duodenal ulcers by vagotomy and pyloroplasty, 4 died (of the anesthesia, infarction, shock, and renal failure, resp.) and 2 developed fistulas which healed spontaneously; all 4 fatal cases had been operated on more than 24 hr after the perforation. Other postoperative complications mentioned in the literature can be divided into those which are ascribable to the general condition of the patient or the circumstances of the operation (pulmonary or cardiac complications, abdominal wall infection, subphrenic abscess, intestinal occlusion, eventration, thrombophlebitis), those ascribable to the surgical act *per se* or surgical error (duodenal fistulas, injuries to the spleen, esophagus or biliary tract), those ascribable to vagotomy *per se* (recurrent ulcer, diarrhea, dumping syndrome, gastric atonia, cardiospasm, paralytic ileus, diaphragmatic hernia), and those ascribable to the particular combination of vagotomy in the presence of bleeding or perforation (recurrent bleeding, fistula formation, empyema or mediastinitis).

4263 THE FUNCTIONAL RESULTS OF VAGOTOMY: POSTOPERATIVE RADIOLOGICAL ASPECTS.

(Fr.) Kiekens, R. (Brugmann Hosp., Brussels, Belgium), L. Engelholm, J. P. Govaerts, N. Dumont and A. Hermanus. *Acta Gastroent Belg* 31(4/5):288-298, 1968.

Among 77 patients treated by vagotomy and pyloroplasty for peptic ulcers, 7 complained of postoperative dysphagia (disappearing in 1-2 months in 6 cases and requiring dilatation in 1), 8 had transitory pyrosis and regurgitation, 12 complained of a feeling of fullness and lack of appetite (disappearing in 2 months in all but one who required medical treatment), 4 had intermittent postoperative diarrhea, 3 had a mild dumping syndrome (in 2 cases after ingestion of milk), and in 2 cases the reestablishment of intestinal peristalsis was delayed by splenic hemorrhage. The average volume of fluid drained from the stomach was 185 ml on the first postoperative day, 342 ml on the 2nd and 250 ml on the 3rd, and there was no significant hypersecretion (maximum daily volume of 2000 ml), possibly because only 2 of the 77 patients had pyloric stenosis. A normal diet was generally resumed in about 5 days, at the same time as the return of normal intestinal function. Radiology of the esophagus, stomach and small intestine revealed few abnormalities in any of these patients, although in one case of dysphagia the descent of barium capsules was seen to stop at the cardia, and 2 cases showed gaseous dilatation of the colon. Based on this experience and a review of the literature, it is concluded that serious complications are rare after vagotomy and drainage procedures. The esophageal disturbances are attributable to operative manipulation (although 3 of the 7 cases of dysphagia occurred after selective vagotomy which did not disturb the esophageal mucosa), the diarrhea is probably related to a decrease in gastric acidity, and gastric stasis is caused principally by hypotonia of the gastric musculature.

4264 THE RESULTS OF VAGOTOMY IN THE TREATMENT OF DUODENAL ULCER. *(Fr.)*

Adloff, M. (Munic. Hosp., Strasbourg, France), J. J. Kohler and A. G. Weiss. *Acta Gastroent Belg* 31(4/5):305-328, 1968.

Total subdiaphragmatic vagotomy was combined with pyloroplasty (54 cases), gastroenterostomy (72 cases) or antropylorectomy (39 cases) in the treatment of 165 patients (141 males and 24 females, mostly 20-60 yr old) with chronic uncomplicated duodenal ulcers, followed for a period of from 9 months to 10 yr. There were 3 postoperative deaths, caused by pulmonary embolism, choleriform diarrhea and massive gastrointestinal hemorrhage, resp. Serious complications included 3 cases of gastrointestinal hemorrhage (one due to diffuse hemorrhagic gastritis of the stump following antropylorectomy), 2 duodenal fistulas, one surgical injury to the spleen requiring splenectomy, 2 cases of postoperative vomiting, 4 cases of severe diarrhea, and 9 cases of dysphagia (2 of which required gastrostomy following development of esophageal stenosis). A recurrent ulcer was diagnosed in 5 cases, including 2 of those receiving pyloroplasty, 3 of those receiving gastroenterostomy, and none of those receiving antropylorectomy. Intubation under resting conditions revealed gastric anacidity in 70%, 61% and 95%, resp., of the three treatment groups. The response to histamine was decreased by 73.1%, 62.3% and 92%, resp. A dumping syndrome was noted in 10.1%, 6.1% and 17.3% of the 3 groups, however, and diarrhea was reported by 14%, 19% and 20%, resp., while postoperative weight loss was seen in 17%, 32% and 40%. Biliary tract radiology was performed in only 11 cases, one of which was found to have developed cholelithiasis. Excellent long-term results were obtained in a total of 74.1% (distributed almost equally among the 3 treatment groups), with intermediate results in 20.5% and poor results in only 5.4%.

4265 THE LONG-TERM RESULTS OF VAGOTOMY IN THE TREATMENT OF PEPTIC ULCER.

(Fr.) Rogister, G. (Inst. Med., Liege, Belgium) and A. Brassinne. *Acta Gastroent Belg* 31(4/5):361-368, 1968.

Total vagotomy (by the thoracic route in 19 of 21 cases) was used in the treatment of 21 patients (20 men and 1 woman, 17-47 yr old) who developed recurrent anastomotic ulcers 15 days to 28 yr (less than 1 yr in 13 cases) after gastric surgery for peptic ulcers (gastrectomy in 14, gastroenterostomy in 5, antrectomy in 1, and gastrectomy plus interposition of a colonic segment in 1); 3 of these patients were bleeding severely at the time of vagotomy, 2 complained of "dumping" and 3 complained of gastric fullness. A follow-up of 2-17 yr (5-17 yr in 16 of 21) after vagotomy revealed only one recurrence (1 yr postoperatively) and one patient in whom scar formation resulted in stenosis of the gastroenterostomy, requiring another operation. Fifteen patients returned to work and 11 gained weight. The gastric acidity was reduced significantly in most cases studied, although one patient was cured despite a persistent normal histamine response. There was no operative mortality and no fistula formation, and the only directly related complication was one case of accelerated intestinal transit. The dumping syndrome and gastric fullness were not affected by vagotomy. Although 2 patients required cholecystectomy for cholelithiasis 6-7 yr after vagotomy, it is concluded that vagotomy is a safe and effective procedure for the treatment of anastomotic ulcers.

4266 THE LONG-TERM RESULTS OF SELECTIVE VAGOTOMY FOR DUODENAL ULCER. *(Fr.)*

Alexiu, O. (109 Rue Agricultori, Bucharest, Romania) and E. Pacescu. *Acta Gastroent Belg* 31(4/5):369-376, 1968.

Among 205 patients treated for chronic (126), perforated (35) or bleeding (44) peptic ulcers (gastric in 21, duodenal in 191) during the period 1961-67, 50 received a total vagotomy (plus gastric resection in 22 of 50) and 155 received selective vagotomy (plus gastric resection in 82 of 155); drainage operations performed included gastroenterostomy (9 cases), Reichel-Polya gastrectomy (6 cases), Pean-Billroth I gastrectomy (98 cases), pyloroplasty (39 cases), and side-to-side juxtapyloric gastroduodenostomy (53 cases), distributed more or less equally among the total-vagotomy and selective-vagotomy groups. There was no mortality. Results were excellent in 60-68% of those receiving total vagotomy, with or without resection (being poor in 4.5% of those resected and 0% of those not resected), and in 85-89% of those receiving selective vagotomy (poor in 3.6% with resection and 5.4% without resection). With regard to drainage procedures, the best results were obtained with side-to-side juxtapyloric gastroduodenostomy (97.5% excellent results after selective vagotomy). The 7 failures among patients receiving selective vagotomy included one patient with malabsorption due to gastric anacidity, 3 with recurrent ulcers due to incomplete vagotomy, 2 who were reoperated for unknown reasons, and one patient with a poor postoperative course who was lost to follow-up after 4 months. It is concluded that selective is superior to total vagotomy, given the proper indications and good technique, and that complementary gastric resection is not only unnecessary in most cases but leads to a higher incidence of malabsorption.

4267 EFFECT OF HYPOXIA ON THE DEVELOPMENT OF GASTRIC ULCERS IN PYLORUS-LIGATED, RESERPINE-TREATED AND IMMOBILIZED RATS.

(E.) Hideg, J. (Dept. Path., U. Med. Sch., Budapest, Hungary), F. Gelencser, T. Gati and G. Lusztig. *Acta Biol Med German* 21(1):13-22, 1968.

Ligation of the pylorus led to the development of gastric ulcers in all 30 fasted male rats kept under the usual conditions but in only 1 of 25 rats kept under conditions of hypoxia (a pressure chamber with a simulated altitude of 7000 m) for 18 hr; the "ulcer index" in the two groups was approximately 21 and 1, resp. This protective effect of hypoxia is ascribed to the marked decrease in peptic activity under hypoxia, with an average decrease in gastric secretion from 6.5 to 1.5 ml/100 g, a corresponding decrease in both free and total acid, and an increase in gastric pH from about 1.1 to 1.5. Reserpine (1.0-5.0 mg/kg i.m.) produced gastric ulcers in all 37 fasted female rats kept under the usual conditions and all 40 rats kept under hypoxic conditions for 24 hr; the ulcer index, however, was 12.0-16.8 in the hypoxic animals compared to only 4.2-6.5 in controls. At 0.1 mg/kg i.m., reserpine produced gastric ulcers in 72% of hypoxic rats and 13% of control rats, and the ulcer index was 1.5 and 0.1, resp. Restraint (enclosure in small wire cages) yielded gastric ulcers in 13 of 15 230-240 g rats kept under the usual conditions for 24 hr, compared to 17 of 17 rats kept under hypoxia, and in only 1 of 15 150-160 g rats kept under the usual conditions for 6 hr, compared to 14 of 15 kept under hypoxic conditions; the ulcer index in these four groups was 1.7, 14.7, 0 and 5.0, resp. Glandular ulcers are thus aggravated by hypoxia, while ulcers of the gastric rumen are prevented. The aggravating effect of hypoxia on reserpine or stress ulcers is ascribed both to cellular lesions and to the increased secretion of adrenocortical and pituitary hormones, as well as to the inability of hypoxia to prevent the increase in gastric secretion caused by reserpine or stress.

4268 SIGNIFICANCE OF PANCREATIC LIPASE ON PATHOGENESIS OF EXPERIMENTAL PEPTIC ULCER. *(E.)* Morimoto, M. (Maruta's Surg. Clin., Shinshu U., Matsumoto, Japan). *Med J Shinshu U* 13(1):67-73, 1968.

The effect of the administration of lipase and inactivated pancreas extract on the development of Mann-Williamson ulcer was investigated in 13 adult dogs. Isolated duodenal segments were transplanted to the terminal ileum 20 cm from the ileocecal valve and gastroduodenostomy was performed. The dogs were grouped as follows: 1) mixture of 1% lipase solution and inactivated pancreas extract, 2) inactivated pancreas extract given 1 hr after administration of 1% lipase solution, 3) inactivated pancreas extract given 8 hr after 1% lipase solution, and 4) mixture of 1% inactivated lipase solution and inactivated pancreas extract. Ulcers did not develop in the first group of 3 dogs. Ulcers did develop in 2 of 4 dogs in group 2 and in all dogs in groups 3 and 4. There was no apparent connection between the ulcer development and gastric acidity (which decreased in both ulcerated and nonulcerated dogs), nor between ulcer development and histologic findings in the liver and pancreas (no noticeable differences in any of the groups). It is concluded that ulcer-inhibiting substances are present in lipase and in inactivated pancreas extract and that their simultaneous administration inhibits ulcer development.

4269 THE EMERGENCY SURGICAL TREATMENT OF MASSIVELY BLEEDING PEPTIC ULCER. *(E.)* Hampson, L. G. (Montreal Gen. Hosp. Quebec, Canada), D. S. Mulder, G. L. Elias and J. D. Palmer. *Arch Surg* 97: 450-458, 1968.

Experience with an aggressive medical-surgical team approach to the management of bleeding peptic ulcer is reported. The procedure was used on 190 patients, including 140 (117 men and 23 women, 68% over 50 yr old) with duodenal and 50 (32 men and 18 women) with gastric ulcers. Preoperative blood pressures below 80 mm Hg were noted in only 27% of the duodenal and 20% of the gastric ulcer patients; this reflected the program of rapid blood replacement. Timing of the operations was critical; 65% of the patients were operated on within 48 hr and half of the 35% operated on after 48 hr rebled. The indication for surgery was the failure to resolve hypotension and shock with one unit of blood/8 hr. The operation of choice was subtotal gastrectomy, given to 117 of 140 duodenal ulcer patients and 45 of 50 gastric ulcer patients. Other procedures included antrectomy and vagotomy, hemigastrectomy and vagotomy, pyloroplasty and vagotomy, and suture. There were 11 deaths, including 10 in patients with duodenal ulcer and 10 following subtotal gastrectomy. Age was a factor since the highest mortality in the duodenal ulcer group was for those 50-60 yr of age. Serious associated diseases were also connected with higher mortality, and rebleeding was associated with a poor prognosis: 3 of the 5 duodenal ulcer patients who rebled died, as did the one gastric ulcer patient who rebled. Since 9 of the 11 patients died within 48 hr of admission, delay in the operation was not the primary cause of failure. It is concluded that rapid replacement of blood losses and judicious selection of both the type of operation and patients who might benefit from surgical treatment should result in lower mortality.

4270 INFLUENCE OF THE ABO BLOOD GROUPS AND SECRETOR STATUS ON BLEEDING AND ON PERFORATION OF DUODENAL ULCER. *(E.)* Evans, D. A. P. (Dept. Med., U. Liverpool, England), L. Horwich, R. B. McConnell and M. F. Bullen. *Gut* 9(3):319-322, 1968.

In view of the known association between blood group O and bleeding peptic ulcers, the medical records of 466 female patients who were diagnosed as having menorrhagia were analyzed to determine whether there is an association between blood group O and bleeding outside the gastrointestinal tract. The incidence of blood group O in these patients did not differ significantly from that in an appropriately large general control population, indicating that blood group O does not specifically influence hemostatic mechanisms. There is known to be a stronger association between blood group O and duodenal ulcers which have bled, than between blood group O and duodenal ulcers which have caused pain or obstruction without bleeding. Group O was also found to be more common than normal in patients with perforated duodenal ulcers. It is concluded that the genes which make up this blood group may play a part in determining the severity of duodenal ulcers, probably via a direct effect on the gastrointestinal mucosa.

4271 DUODENITIS AND DUODENAL ULCER: A BIOPSY STUDY. *(E.)* Cheli, R. (Inst. Spec. Med. Path., U. Genoa, Italy). *Digestion* 1(3):175-182, 1968.

Among 24 patients (23-61 yr old) with duodenal ulcers of 6 months to 20 yr duration (21 duodenal bulb ulcers, 2 post-bulbar or 2nd segment ulcers, and 1 coexisting gastric and bulbar ulcer), which had been diagnosed by X-ray and confirmed during subsequent surgical intervention, 6 (with bulbar ulcers of 8 months to 20 yr duration) were subjected to mucosal biopsy at the ulcer site, 12 (including 11 with bulbar ulcers and 1 with a post-bulbar ulcer, of 8 months to 6 yr duration) were subjected to biopsy from an area other than the ulcer site (the duodenal bulb in 1, the 2nd segment in 5, and the 3rd segment in 6 cases), and 6 (including 4 with bulbar ulcers, 1 with a post-bulbar ulcer and 1 with both gastric and bulbar ulcers, of 9 months to 15 yr duration) were subjected to 3 biopsies per patient without regard to the ulcer site. In the 1st group, biopsies from the ulcer site revealed atrophic duodenitis in 4 cases, superficial duodenitis in 1 and normal mucosa in 1 (with an ulcer of 7 yr duration). In the 2nd group, all biopsy specimens were normal except for 2 (one from the 2nd duodenal segment and one from the bulb) which showed superficial duodenitis. In the 3rd group, bulbar biopsies revealed superficial duodenitis in 2 patients with bulbar ulcer and 1 patient with both gastric and bulbar ulcers, atrophic duodenitis in 2 patients with bulbar ulcer, and normal mucosa in 1 patient with post-bulbar ulcer; 2nd segment biopsies revealed superficial duodenitis in 1 patient with bulbar ulcer, 1 patient with both gastric and bulbar ulcers, and 1 patient with post-bulbar ulcer, and normal mucosa in 3 patients with bulbar ulcer; 3rd segment biopsies revealed normal mucosa in all 6 patients. The results show that the inflammatory lesions are a local phenomenon found only in the vicinity of the ulcers. They do not represent true duodenitis, which is diffuse and where inflammation extends to at least 3 segments of the duodenum in most patients.

4272 RECENT HISTORY OF ISCHAEMIC HEART DISEASE AND DUODENAL ULCER IN DOCTORS. *(E.)* Meade, T. W. (London Sch. Hyg. Trop. Med., England), T. H. D. Arie, M. Brewis, D. J. Bond and J. N. Morris. *Brit Med J* 3(5620):701-704, 1968.

Data are presented on the incidence of coronary heart disease and duodenal ulcer (including peptic ulcer) during 1947-50, 1957-60 and 1961-65 among the 6000-7000 male physicians (35-64 yr old) holding "immediate sickness benefit" policies with the Medical Sickness Annuity and Life Assurance Society Ltd. of Great Britain. There was a decrease in the incidence of duodenal ulcers from 0.21% in 1947-50 to 0.13% in 1957-60 and 0.10% in 1961-65, considering only "definite" cases, and from 0.31% to 0.24% and 0.17%, resp., considering both "definite" and "possible" cases. This decrease was seen in all age groups, and can probably not be explained by changes in diagnostic habits, the age structure of the population, or the period of absence from work following onset of duodenal ulcer. The decline is therefore concluded to be real. Although the incidence of coronary heart disease showed an apparent increase between the 2nd and 3rd periods covered in the study, this increase is apparently less than the increase in the population as a whole. The possible role of smoking habits in the morbidity of coronary heart disease is discussed.

4273 DIGESTIVE HEMORRHAGES OF ULCEROUS ORIGIN (BASED ON 408 CASES). *(Fr.)* Leutenegger, M. (U. Hosp. Ctr., Algiers, Algeria), G. Illoul, P. Colonna, M. Ait Mesbail, G. Timsit and M. Eddaikra. *Tunisie Med* (6):387-395, 1967.

4274 THE LATE RESULTS OF GASTRIC SURGERY. *(E.)* Pulvertaft, C. N. (County Hosp., York, England). *Postgrad Med J* 44(514):613-617, 1968.

4275 THE SURGICAL TREATMENT OF PEPTIC ULCER. *(E.)* Gillespie, I. E. (Dept. Surg., Western Infirm., Glasgow, Scotland). *Postgrad Med J* 44(514):608-612, 1968.

4276 THE MEDICAL TREATMENT OF GASTRIC AND DUODENAL ULCER. *(E.)* Langman, M. J. S. (U. Coll. Hosp., London, England). *Postgrad Med J* 44(514):603-607, 1968.

4277 COMMENTS ON THE INCIDENCE AND NATURAL HISTORY OF GASTRIC AND DUODENAL ULCER. *(E.)* Pulvertaft, C. N. (County Hosp., York, England). *Postgrad Med J* 44(514):597-602, 1968.

4278 GASTRIC RESECTION AND METABOLIC BONE DISEASE. *(E.)* Pulvertaft, C. N. (County Hosp., York, England). *Postgrad Med J* 44(514):618-620, 1968.

4279 STUDIES ON THE EXPERIMENTAL GASTROINTESTINAL ULCERS PRODUCED BY RESERPINE AND STRESS 3. EFFECTS OF MONOAMINES AND THEIR PRECURSORS. *(E.)* Doteuchi, M. (Shionogi Res. Lab., Fukushima-ku, Osaka, Japan). *Jap J Pharmac* 18(2):175-184, 1968.

4280 THE ASSOCIATION OF DUODENAL ULCER WITH DOLICHOCOLON. *(Fr.)* Seror, J. (Mustapha Hosp., Algeria), B. Mentouri and H. Issad. *Ann Chir* 22(11/12):767-772, 1968.

4281 PEPTIC ULCER IN NIGERIAN CHILDREN. *(E.)* Solanke, T. F. (U. Coll. Hosp., Nigeria) and A. U. Antia. *W Afr Med J* 17(4):110-114, 1968.

4282 DRAINAGE TECHNIQUES FOR DUODENAL ULCERATION. *(E.)* Scott, P. R. (Royal Melbourne Hosp., Australia). *Aust New Zeal J Surg* 38(1): 11-15, 1968.

4283 THE RESULTS OF SURGICAL TREATMENT FOR PEPTIC ULCERATION, 1960-1964. *(E.)* Gillett, D. J. (Repatriation Gen. Hosp. Concord, New South Wales), R. M. Dunn and M. T. Phells. *Aust New Zeal J Surg* 38(1):7-10, 1968.

4284 PERFORATED DUODENAL ULCER FOLLOWING INJURY OR OPERATION. *(E.)* Gear, M. W. L. (United Oxford Hosp., England). *Brit J Surg* 55(8): 585-587, 1968.

4285 MASSIVE BLEEDING FROM ULCERS. *(Ger.)* Dalichau, H. (Northwest Hosp., Frankfurt, Germany), E. Ungeheuer and G. Schade. *Fortschr Med* 86(16): 586-688, 1968.

4286 A CLINICAL TRIAL OF AN ORAL UREA PREPARATION (CARBAMINE) IN PEPTIC ULCER THERAPY. *(E.)* Christopher, L. (St. Vincent's Hosp., Dublin U. Coll., Ireland) and O. Fitzgerald. *Irish J Med Sci* 1(6):243-253, 1968.

4287 PEPTIC ULCER IN LONG-TERM INSTITUTIONALIZED SCHIZOPHRENIC PATIENTS. *(E.)* Hussar, A. E. (VA Hosp., Montrose, N. Y.). *Psychosom Med* 30(4):374-377, 1968.

4288 *IN VIVO* EFFECT OF SOME ANTACIDS AND FOODSTUFFS OF GASTRIC pH: ITS IMPORTANCE IN THE TREATMENT OF PEPTIC ULCER. *(Pol.)* de Paula Castro, L. (Med. Fac., U. Minas Gerais, Brazil) and H. P. Resende. *Rev Ass Med Minas Gerais* 19(1):53-61, 1968.

4289 PEPTIC ULCER PERFORATION. *(Ger.)* Heinrich, P. (Surg. Clin., Rostock U., Germany) and M. Hille. *Bruns Beitr Klin Chir* 216(5):431-441, 1968.

4290 **GASTRIC MUCOSAL COMPETENCE AND ITS ROLE IN THE ETIOLOGY OF PEPTIC ULCERS.** *(E.)* Wlodek, G. K. (Montreal Gen. Hosp., Canada). *Canad Med Ass J* 99(10):483-488, 1968.

4291 **NOCTURNAL GASTRIC SECRETION IN PEPTIC ULCER PATIENTS.** *(Sp.)* Aste O., H. (Naval Hosp., Valparaiso, Chile), S. Avendano E., E. Bitran P. and G. Cenitagoya D. *GEN* 22(3):179-188, 1968.

4292 **VAGOTOMY AND PYLOROPLASTY FOR MASSIVELY BLEEDING DUODENAL AND GASTRIC ULCERS.** *(E.)* Klingensmith, W. (Amarillo, Texas) and P. Oles. *Amer J Surg* 116(5):759-762, 1968.

4293 **A COMPARATIVE STUDY OF THE HEINECKE-MIKULICZ AND FINNEY PYLOROPLASTY.** *(E.)* Hayden, W. F. (VA Hosp., Little Rock, Ark.) and R. C. Read. *Amer J Surg* 116(5):755-758, 1968.

4294 **BODY BUILD AND SERUM LIPIDS IN MALE PATIENTS HOSPITALIZED FOR PEPTIC ULCER OR MYOCARDIAL INFARCTION.** *(E.)* Hellstrom, R. (Danderyd Hosp., Sweden). *Acta Med Scand* 184(1-2):19-24, 1968.

4295 **THE DEPENDENCE OF ACUTE GASTRIC HEMORRHAGE ON PHASES IN THE WEATHER** *(Ger.)* Brezowsky, H. (Med. Meteorol. Svc., German Weather Bur., Bad Tölz, Germany) and W. Hartl. *Med Klin* 62(49): 1899-1901, 1967.

4296 **ANTRECTOMY PLUS JEJUNAL TRANSPOSITION PLUS SELECTIVE VAGOTOMY.** *(E.)* Hedenstedt, S. (Dept. Surg., Nacka Hosp., Sweden) and G. Lundquist. *Acta Chir Scand* 134(5):373-378, 1968.

4297 **DEFINITIVE SURGICAL TREATMENT IN DUODENAL ULCER DISEASE.** *(E.)* Scott, W. H. Jr., J. L. Sawyers, W. G. Gobbel Jr. and J. L. Herrington Jr. *Curr Prob Surg* (10):4-51, 1968.

4298 **SURGICAL ASPECTS OF GASTROINTESTINAL HAEMORRHAGE.** *(E.)* Clark, C. G. (U. Coll. Hosp. Med. Sch., London, England). *Postgrad Med J* 44(514):590-593, 1968.

4299 **EARLY AND LATE COMPLICATIONS FOLLOWING GASTRIC RESECTION FOR PEPTIC ULCER DISEASE.** *(Rus.)* Napalkov, P. N. (Leningrad San. Hyg. Med. Inst., USSR). *Sovet Med* (7):100-105, 1968.

4300 **ULCERATIONS AND ACUTE ULCERS OF THE STOMACH.** *(Fr.)* Sava, G. *France Med* 30(6):273- , 1967.

See also abstract nos.: 3761,4634

Regional Enteritis

4301 **FOLATE DEFICIENCY IN CROHN'S DISEASE: INCIDENCE, PATHOGENESIS, AND TREATMENT.** *(E.)* Hoffbrand, A. V. (St. Bartholomew's Hosp., London, England), J. S. Stewart, C. C. Booth and D. L. Mollin. *Brit Med J* 2(5597):71-75, 1968.

The incidence, pathogenesis and treatment of folic acid deficiency is discussed in 64 patients (27 males and 37 females, 8-67 yr old, mean 34.5 yr) with Crohn's disease of up to 25 yr duration. Serum B_{12} levels were normal in 51 cases but serum folate levels (determined by the method of Waters and Mollin) were subnormal in 52 patients (and 18 had levels below 3 mμg/ml). Red-cell folate levels were subnormal in 7 patients. Positive formiminoglutamic acid tests (12 patients) and increased urocanic acid excretion (3 patients) were noted in the most severely ill patients. Anemia was present in 28 patients, which made it difficult to determine the effect of the folate deficiency. Bone marrow examinations showed megaloblastic changes in 12 of 17 anemic patients and in 3 nonanemic patients. Folate deficiency appeared to be due to a combination of inadequate dietary intake, excess utilization and malabsorption. There was a marked subjective improvement and weight gain in 7 patients given folate therapy (15 mg/day) and a definite hematological improvement in the 3 most severely ill patients, but a complete hematological remission did not result from folate therapy alone. In 3 patients with active Crohn's disease, folate deficiency remitted spontaneously after successful surgical treatment of the disease itself. It is concluded that severe folate deficiency is a frequent complication of active Crohn's disease and that folate therapy may prove beneficial in many of these patients. However, vitamin B_{12} should always be tried first.

4302 **REGIONAL ILEITIS AND PSYCHIATRIC DISORDER.** *(E.)* Whybrow, P. C. (U. North Carolina Sch. Med., Chapel Hill), F. J. Kane Jr. and M. A. Lipton. *Psychosom Med* 30(2):209-221, 1968.

A retrospective study was made of psychiatric disturbances in 39 persons (19 females and 20 males) with proven regional ileitis. The average age at onset of the illness was around 30 yr and the age at diagnosis ranged from 13 to 64 yr, with a mean of 32.6 yr. A clear correlation between psychological stress and an exacerbation of the disease process was found in 64% of the group. Depression was the major psychiatric symptom seen during hospitalization (38% of the group), and it appeared to be linked with the duration and severity of the disease process. While no specific personality characteristic could be defined in this group, 40% did show a predominantly passive-dependent personality constellation. However, the fact that 38% of the group had evidence of other "psychosomatic" disorders militated against the concept of a specific personality profile predisposing an individual to regional ileitis.

4303 **FREE BOWEL PERFORATIONS WITH REGIONAL ENTERITIS.** *(E.)* Midgley, F. M. (U. Michigan Med. Ctr. Hosp., Ann Arbor) and N. W. Thompson. *Arch Surg* 97(4):553-557, 1968.

4304 **REGIONAL ENTERITIS AND GRANULOMATOUS COLITIS ASSOCIATED WITH ERYTHROCYTE GLUCOSE-6-PHOSPHATE DEHYDROGENASE DEFICIENCY.** *(E.)* Sheehan, R. G. (Boston Floating Hosp., New Eng. Med. Ctr. Hosp., Boston, Mass.), T. F. Necheles, R. J. Lindeman, H. J. Meyer and J. F. Patterson. *New Eng J Med* 277(21):1124-1126, 1967.

See also abstract nos.: 3891,4307,4330,4374

4305 **IMPAIRMENT OF INTESTINAL DECONJUGATION OF DIETARY FOLATE: A POSSIBLE EXPLANATION OF MEGALOBLASTIC ANAEMIA ASSOCIATED WITH PHENYTOIN THERAPY.** *(E.)* Rosenberg, I. H. (Harvard Med. Sch., Boston, Mass.), R. R. Streiff, H. A. Godwin and W. B. Castle. *Lancet* 2(7567):530-532, 1968.

Studies were made of the effect of phenytoin (diphenylhydantoin) on the intestinal absorption of conjugated folate in an attempt to explain the mechanism for the folate deficiency and megaloblastic anemia which may accompany chronic anticonvulsant therapy. It was found that while phenytoin had no significant affect on the absorption of free folate in healthy volunteers, it did impair the intestinal absorption of conjugated folate in some of them. *In vitro* deconjugation of polyglutamic folate by homogenates of human intestinal mucosa was also inhibited by phenytoin. It is suggested that the mechanism of these observations may be inhibition of enzymes responsible for the intestinal deconjugation of folate sources in the diet.

4306 **MECHANISM OF FOLATE DEFICIENCY IN PATIENTS RECEIVING PHENYTOIN.** *(E.)* Hoffbrand, A. V. (Royal Postgrad. Med. Sch., London, England) and T. F. Necheles. *Lancet* 2(7567):528-530, 1968.

An investigation was made of the possible causes of the folate deficiency and megaloblastic anemia which may develop in patients on anticonvulsant therapy. Folate conjugase is thought to split folate polyglutamates, which are the major fraction of dietary folate, into a simpler monoglutamate form which then enters the portal blood stream. It was concluded that phenytoin (diphenylhydantoin), causes a reduction in the absorption of food folate polyglutamates through its inhibition of this enzyme. This hypothesis was supported by the fact that phenytoin inhibited human small intestinal folate conjugase *in vitro*. It was noted that while phenytoin inhibits the absorption of folate from folate polyglutamates, it does not inhibit absorption of folic acid itself.

4307 **URINE INDICAN EXCRETION IN MALABSORPTIVE DISORDERS.** *(E.)* Greenberger, N. J. (Ohio St. U. Coll. Med., Columbus), S. Saegh and R. D. Ruppert. *Gastroenterology* 55(2):204-211, 1968.

A study was made of twenty-four hour urine indican excretion on a large group of control subjects and in patients with a variety of malabsorptive disorders in order to determine the value of this test in the differential diagnosis of malabsorption. It was found that normal subjects excreted 38 mg of indician per 24 hr ± 5, while hospitalized patients without malabsorption excreted 33 mg per 24 hr ± 22. Contrasted to this was the excretion rate of 113 mg per 24 hr ± 50 in 21 patients with malabsorption and 100 mg per 24 hr ± 45 in 18 patients with regional enteritis. There also appeared to be a significant correlation between the degree of steatorrhea present and the amount of indican excretion in the urine. It was found that patients with regional enteritis who had received Azulfidine showed urine indican levels below 70 mg per 24 hr despite the persistence of significant steatorrhea. It was suggested that Azulfidine interfered with the color reaction in the method employed for the indican determinations. An analysis of the data indicated that elevated urinary indican excretion is a nonspecific finding which may be present in diseases associated with bacterial overgrowth of the small bowel as well as a variety of malabsorptive disorders.

4308 **FAT ASSIMILATION AFTER MASSIVE DISTAL PANCREATECTOMY.** *(E.)* Kaiser, M. H. (U. Miami Sch. Med., Florida), C. A. Leite and W. D. Warren. *New Eng J Med* 279(11):570-576, 1968.

Fat assimilation was determined by 219 daily balance studies in 7 patients who had had massive distal pancreatectomies for pancreatitis with preservation of the gut lumen integrity. Lipase concentration, pH, and hydrolytic products in the intraluminal contents were determined. In 6 patients with 95% pancreatectomies, the mean coefficient of fat absorption was 80%. In 1 patient with a 75% pancreatectomy, fat assimilation was unimpaired. Fat assimilation was similarly improved whether the replacement therapy was given with meals or every hour while awake. Lipase concentrations in the jejunum were 10% that of controls. Triglyceride hydrolysis was unimpaired, but there was impaired lipolysis of diglycerides. Five patients were found to have impaired glucose metabolism requiring 22-50 U of insulin daily.

4309 **STUDIES OF MALABSORPTION AND CALCIUM EXCRETION INDUCED BY NEOMYCIN SULFATE: EFFECT OF INTESTINAL SITE, BILE SALT, AND PANCREATIC ENZYMES.** *(E.)* Gordon, S. J. (Upstate Med. Ctr., State U. New York, Syracuse), E. N. Haro, I. C. Paes and W. W. Faloon. *JAMA* 204(2):129-134, 1968.

Studies of the mechanism of neomycin sulfate-induced malabsorption were made in 11 obese subjects given the drug orally (12 g/day) for 4 days (after a 4 day control period) in a low-calorie diet, then via an inlying tube to the jejunum or ileum for 4 days, and finally for an elective 4-day period in combination with either sodium glycocholate (1.8 g/day), sodium bicarbonate (3 g/day), pancreatic extract (10.8 g/day) or sodium taurocholate (1.5 g/day). The average daily fat excretion was: control, 3.7 g; neomycin given orally, 17 g; neomycin to the jejunum, 11.8 g; and neomycin to the ileum, 5.8 g. Fecal calcium was increased by neomycin but was higher with jejunal than with oral administration. *In vitro* studies showed no precipitation when neomycin was added to a calcium chloride solution. Fecal sodium, potassium and nitrogen were not affected except for a decrease in fecal sodium with ileal administration. Urinary calcium, sodium and potassium levels were frequently greater with jejunal or ileal administration than with oral administration. The rise in urinary calcium levels was considered to be due to metabolic acidosis. The studies made in the elective period showed no improvement in the neomycin-induced malabsorption. Decreased fat loss due to variations in the neomycin delivery may be due to the effect of the antibiotic at particular sites rather than to a systemic effect, or to a change in bacterial flora in the colon. It is also suggested that the site of greatest total calcium absorption may be the jejunum and ileum, since the fecal excretion of calcium was greatest with jejunal administration, even though the highest rate of calcium absorption may be in the duodenum.

310 **INTESTINAL ABSORPTION AND AUTOIMMUNITY IN ENDOCRINE DISORDERS.** *E.)* Siurala, M. (Cent. U. Hosp., Helsinki, Finland), K. Varis nd B. A. Lamberg. *Acta Med Scand* 184(1/2):53-64, 1968.

he following gastroenterological examinations were performed n 32 patients with endocrine disorders: gastric biopsy (25 atients), maximal histalog test (4), biopsy of the small inestine (30), fecal fat excretion determined by the van de Kamer method (32), vitamin A absorption test (23), d-xylose olerance test (28), and the Schilling test (18). Gastritis was ound in 18 patients (atrophic in 10, of whom 2 had pernicious nemia with idiopathic hypothyroidism). Jejunal biopsy reealed normal mucosa in 20 patients, an increase of "inflamnatory" cells in 4 and villous alterations in 6, of whom 3 had pontaneous hypothyroidism and two showed signs of automune thyroiditis. A general malabsorption syndrome was present in 8 patients, one had steatorrhea and one had possible selective malabsorption of vitamin B_{12}. Of 19 patients with thyroid disease alone or in combination with other endocrine disorders, 7 showed signs of malabsorption (6 had villous alterations which were associated with immunological disturbances and one patient had postoperative hypothyroidism). These patients did not respond to endocrine treatment nor to treatment with gluten-free diet (except for the patient without immunological changes). Distinct edema of the muscularis mucosae was visible in 13 of 16 patients with hypothyroidism. It is concluded that malabsorption and villous changes may be due to: 1) myxedematous changes; 2) altered motility; or 3) autoimmune phenomena. Of 12 patients with hypoparathyroidism alone or in combination with other disorders, 4 had signs of malabsorption but only one with concomitant hypothyroidism and high thyroid antibody titers had villous alterations. Correction of calcium metabolism in 3 patients resulted in improvement of steatorrhea in all but one with concomitant thyroid disease. This may point to a purely functional relationship between absorption and calcium metabolism.

4311 **ADULT COELIAC DISEASE.** *(E.)* Stewart, J. S. (West Middlesex Hosp., Isleworth, England). *Postgrad Med J* 44(514):632-640, 1968.

4312 **LACTOSE INTOLERANCE IN CHILDHOOD COELIAC DISEASE: ASSESSMENT OF ITS INCIDENCE AND IMPORTANCE.** *(E.)* McNeish, A. S. (Royal Hosp. Sick Child., Glasgow, Scotland) and E. M. Sweet. *Arch Dis Childh* 43(230):433-437, 1968.

4313 **GLUCOSE-GALACTOSE MALABSORPTION: A STUDY WITH BIOPSY OF THE SMALL INTESTINAL MUCOSA.** *(E.)* Meeuwisse, G. W. (Lund U. Hosp., Sweden) and A. Dahlqvist. *Acta Paediat Scand* 57(7):273-280, 1968.

4314 **INTESTINAL MALABSORPTION PROGRESS IN DIAGNOSIS AND TREATMENT.** *(E.)* Faloon, W. W. (Upstate Med. Ctr., New York State U., Syracuse) and D. G. Saunders. *New York J Med* 68(19):2552-2556, 1968.

4315 **NECESSARY AND SUPERFLUOUS PROCEDURES IN THE DIAGNOSIS OF SMALL INTESTINAL DISEASES.** *(Ger.)* Ammann, R. (Med. Clin., U. Zurich, Switzerland), U. P. Haemmerli, E. Leuthold, A. von Felten, P. Weidmann and E. Hafter. *Schweiz Med Wschr* 98(28):1044-1047, 1968.

4316 **DERMATITIS HERPETIFORMIS IN THE PATIENTS WITH IDIOPATHIC STEATORRHEA (ADULT COELIAC DISEASE).** *(E.)* Fraser, N. G. (Western Infirm., Glasgow, Scotland), A. Ferguson and D. Murray. *Brit Med J* 4(5622):30-31, 1968.

4317 **COPROANTIBODIES TO GLUTEN IN CELIAC DISEASE.** *(E.)* Herskovic, T. (Yale-New Haven Hosp., Conn.), J. Katz, J. D. Gryboski and H. M. Spiro. *JAMA* 203(10):887-888, 1968.

4318 **MALABSORPTION.** *(E.)* Dyer, N. H. (St. Bartholomew's Hosp., England) and A. M. Dawson. *Brit Med J* 2(5599):225-227, 1968.

4319 **WHIPPLE'S DISEASE PRESENTING WITH OCULAR INFLAMMATION AND MINIMAL INTESTINAL SYMPTOMS.** *(E.)* Knox, D. L. (Johns Hopkins U. Hosp., Baltimore, Md.), T. M. Bayless, J. H. Yardley and P. Charache. *Johns Hopkins Med J* 123(4):175-182, 1968.

4320 **THE MECHANISM OF HYPOGLYCEMIA IN FRUCTOSE INTOLERANCE.** *(Fr.)* Cotte, J. (Debrousse Child. Hosp., Lyon, France), M. Mathieu, J. L. Nivelon, M. Bethenod, C. Kissin and C. Collombel. *Clin Chim Acta* 19(2):215-226, 1968.

4321 **POLYNEUROPATHY AS A LATE OR EARLY COMPLICATION OF THE MALABSORPTION SYNDROME.** *(Rev.)(Ger.)* Noelle, H. (Neurol. Clin., Justus-Liebig U., Giessen, Germany). *Med Klin* 62(51):1984-1986, 1967.

4322 **MALABSORPTION SYNDROME SECONDARY TO JEJUNAL STENOSIS WITH MASSIVE MESENTERIC ADENITIS. [CASE REPORT]** *(E.)* Reynolds, B. M. (Misericordia Hosp., Bronx, New York City) and R. P. Drago. *New York J Med* 68(3):440-443, 1968.

4323 **MECHANISM OF VITAMIN B_{12} MALABSORPTION IN PATIENTS RECEIVING COLCHICINE.** *(E.)* Webb, D. I. (Santa Barbara Gen. Hosp., Calif.), R. B. Chodos, C. Q. Mahar and W. W. Faloon. *New Eng J Med* 279(16):845-850, 1968.

4324 **INTUSSUSCEPTION IN SPRUE.** *(E.)* Ruoff, M. (New York U. Sch. Med., New York City), A. E. Lindner and R. H. Marshak. *Amer J Roentgen* 104(3):525-528, 1968.

4325 **STUDIES OF LACTOSE INTOLERANCE IN FAMILIES.** *(E.)* Welsh, J. D. (800 NE 13 St., Oklahoma City), O. M. Zschiesche, V. L. Willits Jr. and L. Russell. *Arch Int Med* 122(10):315-317, 1968.

4326 **WHIPPLE'S DISEASE [CASE REPORT].** *(E.)* Fearrington, E. L. (Pitt County Mem. Hosp., Greenville, N. C.) and E. W. Monroe. *Postgrad Med* 44(2):103-107, 1968.

See also abstract nos.: 3725,3912,4044,4227,4442

4327 **AN ANALYSIS OF PATIENTS WITH CARCINOMA OF THE RIGHT COLON.** *(E.)* Thomas, W. H. (Yale U. Med. Sch., New Haven, Conn.), R. A. Larson, H. K. Wright and J. C. Cleveland. *Surg Gynec Obstet* 127(2):313-318, 1968.

Among 267 patients (128 men and 139 women, 21-90 yr old) hospitalized at the Yale-New Haven Medical Center with adenocarcinoma of the right colon from 1931 through 1960, the median age rose from 38 yr for 1931-40 to 69 yr for 1951-60, and the peak incidence age shifted from the 6th to the 8th decade of life. The prognosis for long-term survival was found to be related to the duration of symptoms before treatment, the type of presenting symptoms, and the pathologic staging (Duke system). Thus, the 5-yr survival, which averaged 31-42% for all patients and about 50% for those given "curative" resection, was lowest among those presenting with gastrointestinal obstruction and no previous symptoms and highest among those with a 6-12 month history; compared to a 5-yr survival rate of 54% among those presenting initially with hemorrhage, the rate was only 11-28% among those presenting with perforation or obstruction. There was a trend toward earlier diagnosis between 1931 and 1960, but no striking improvement in survival rates. The operation of choice remains right hemicolectomy, although recent "no touch" techniques give substantially better results. The mortality rate due to death from any cause within 30 days after the operation remained essentially the same throughout the 30-yr period. Although the percentage of patients dying of carcinoma in the future may decrease, the addition of auxiliary methods of treatment to standard surgical therapy will probably not appreciably improve long-term survival rates, since many of the older patients die from other causes shortly after potentially curative surgical treatment.

4328 **SYMPTOMS OF CARCINOMA OF THE COLON AND RECTUM.** *(E.)* Keddie, N. (Royal Infirm., Manchester, England) and A. Hargreaves. *Lancet* 2(7571):749-750, 1968.

The symptoms of carcinoma of the colon and rectum were analyzed in detail in 254 patients. Of the patients with colonic cancer, 1/3 presented within 3 months of the onset of symptoms, 1/3 between the 6th and 9th month, and 1/3 had had symptoms for more than 12 months. The patients with rectal cancer generally presented at later stages, but only 25% had had symptoms for more than 12 months. No correlation was found between the duration of symptoms and the tumor stage according to Duke's staging method. In patients with colonic cancer, abdominal pain was a common complaint, but the nature and site varied considerably. In patients with rectal cancer, 29% had rectal or perineal pain, and 26% had abdominal pain. Acute intestinal obstruction was no commoner with tumors on the left (15%) than those on the right (14%). Of patients with right-sided tumors, 59% had weight loss and 20% had bowel symptoms. No patients with left-sided tumors had "classical" morning diarrhea.

4329 **ADRENERGIC MYENTERIC NERVES IN HIRSCHSPRUNG'S DISEASE.** *(E.)* Bennett, A. (King's Coll. Hosp. Med. Sch., London, England), J. R. Garrett and E. R. Howard. *Brit Med J* 1(5590):487-489, 1968.

The possibility of a deficient adrenergic innervation being responsible for the contracted state of the affected bowel in Hirschsprung's disease was studied by using the catecholamine fluorescence technique of Falck and Hillarp on specimens taken from the abnormal resected bowels of 5 children with congenital megacolon (4 months to 3.75 yr old) and the normal bowels of 2 other children. Small full-thickness pieces of gut from different levels of each resected specimen were rapidly frozen, freeze-dried, and treated with formaldehyde gas. Norm large bowel showed a dense arrangement of adrenergic nerves around myenteric ganglion cells containing no catecholamines; few adrenergic nerves were seen in the muscle layers. In Hirschsprung's disease, the myenteric ganglion cell complex was absent from the distal segment of the bowel, but increased numbers of adrenergic nerves were present in the muscle layers. The large nerve bundles which are characteristically seen in the intermuscular zone in this disease were nonfluorescent but som medium-size bundles were fluorescent. Transitional tissue was seen in three cases. These findings indicate that inability of the affected bowel segment to relax is not due to an absence of adrenergic nerves.

4330 **BIOPSIES OF THE LARGE BOWEL IN REGIONAL ENTERITIS.** *(E.)* Anderson, F. H. (Vancouver Gen. Hosp., B. C., Canada) and A. Bogoch. *Canad Med Ass J* 98(1):150-153, 1968.

Biopsies of the rectum or colon were obtained during sigmoidoscopy in 30 patients (12 men and 18 women, average age 37.4 yr) with regional enteritis. The mucosa at sigmoidoscopy was usually normal in appearance or showed minimal hyperemia or edema. Twenty-seven patients had diarrhea; 20 had abdominal pain; 11 had or did have anal lesions and 23 ha some degree of anemia; 12 patients had had resections of the terminal ileum, the small bowel, the cecum or the ascending colon. Mild nonspecific chronic inflammatory changes were seen in the biopsies of 13 patients (43.3%). One had an infiltration of polymorphonuclear leukocytes with crypt abscesses in addition to the lymphocytes, plasma cells and eosinophils found in the other 12 patients. No granulomatous lesions or giant cells were present in any of the sections. Thes nonspecific inflammatory changes seen in patients with Crohn's disease are similar to those seen in mild chronic idiopathic ulcerative colitis and in association with diverticulitis. Radiological examination of the small bowel is suggested before ulcerative colitis is diagnosed.

4331 **VILLOUS ADENOMAS OF THE COLON COMPLICATED BY ELECTROLYTE IMBALANCE.** *(E.)* Deysine, M. (St. Raphael's Hosp., New Haven, Conn.). *Dis Colon Rectum* 11(4):289-291, 1968.

Three case histories (women, aged 70, 84 and 87 yr) of villous adenoma of the rectum complicated by severe electrolyte imbalance are presented. Two patients died due to cardiovascular problems while the third recovered after hydration and electrolyte replacement and a one-stage abdominoperineal excision. Villous adenomas may or may not be accompanied by mucoid discharge, the amount of which is closely related to the degree of electrolyte imbalance; as the tumor grows, the discharge becomes constant and causes irritation of the perianal skin. Patients may lose 1-3 liters of mucus daily (120-160 mEq/liter of sodium; potassium varies with the amount of rectal reabsorption) so that the degree of electrolyte imbalance varies from patient to patient. Mucoitin sulfuric acid is an important component of mucus and there should be a significant depletion of body sulfur in these patients. Sodium loss raises the question of aldosterone secretion and, at the time of surgical removal, a rebound that might produce a fall in serum levels must be guarded against.

4332 **SURVIVAL AFTER RADICAL SURGERY FOR SIGMOID AND RECTAL CANCER IN DENMARK 1943-47 AND 1948-1952.** *(E.)* Sorensen, B. L. (Danish Cancer Registry, Copenhagen, Denmark) and B. Stancke. *Acta Chir Scand* 134(5):392-397, 1968.

A nationwide review is presented of the results of radical surgery for sigmoid (2111 cases) and rectal (5873 cases) cancer treated in Danish hospitals during the periods 1943-47 and 1948-52. The fundamental data consist of reports received by the Danish Cancer Registry on all cases admitted to Danish hospitals, while those not admitted, with the exception of a few cases of cutaneous carcinoma, are covered by death certificates. The proportion of cases subjected to radical surgery increased from the first to the second period (sigmoid cancer, 29 to 41% for men and 31 to 36% for women; rectal cancer, 30 to 40% for men, 30 to 41% for women). This coincides with surgical improvements implemented after World War II. Survival tables for radical surgery are presented separately for localized tumors, for regional spread, for 4 age groups and for the total group in order to compare the 2 periods; an improvement in the 5-yr survival rate is demonstrated. Survival rates for localized sigmoid cancer increased from 29 to 58% for men and from 40 to 57% for women; for localized rectal cancer the survival rate improved from 51 to 54% for men and from 52 to 67% for women (improvement being noted in all age groups).

4333 **PREOPERATIVE IRRADIATION FOR CANCER OF THE RECTUM AND RECTOSIGMOID: PRELIMINARY REVIEW OF RECENT EXPERIENCE (1957-1962).** *(E.)* Stearns, M. W. Jr. (Mem. Hosp. Cancer and Allied Dis., New York City), M. R. Deddish and S. H. Q. Quan. *Dis Colon Rectum* 11(4):281-284, 1968.

A comparison was made of the records of two series of patients with cancer of the rectum who underwent surgical resections for cure, in some cases preceded by radiation, during the years 1939-1951 and 1957-1962, resp. There was an improvement in survival rate in the second group, as compared to the first, in those patients who had metastasis to lymph nodes as proved by examination of the resected specimen. While the factors contributing to this improved survival rate could not be readily identified, it was suggested that improved surgical technique may play a role. This technique included high ligation of the vascular pedicle and subsequent more extensive removal of the lymph-bearing portions of the mesentery, more adequate protection of the wound edges and adjacent viscera, minimal manipulation of the tumor and the bowel until after the proximal vascular pedicle has been ligated, attention to cleansing the pelvis by mechanical irrigation after resection, and treating the open lumen of the bowel ends with antiseptic agents prior to anastomosis. Contrary to the findings in the earlier series alone, there was no evidence that preoperative irradiation as an adjunct to surgical resection had any effect on survival rate.

4334 **INCIDENCE AND SIGNIFICANCE OF ARGENTAFFIN AND PANETH CELLS IN SOME TUMOURS OF THE LARGE INTESTINE.** *(E.)* Gibbs, N. M. (St. Mark's Hosp., London, England). *J Clin Path* 20(6): 826-831, 1967.

A study was made of the incidence of argentaffin and Paneth cells in epithelial tumors of the large intestine. Both type of cells were found in adenomatous polyps, villous adenomas, polyposis coli, Peutz-Jegher's polyps, juvenile polyposis, and adenocarcinomas while only argentaffin cells were found in metaplastic or juvenile polyps. In disorders of epithelial growth the crypt unit was retained while in neoplasms the crypt unit was destroyed, with argentaffin and Paneth cells occurring either as a result of sequestration or because they were taking part in the neoplastic process. It is pointed out that since the identification of argentaffin and Paneth cells enables the crypt to be defined, this can provide a practical aid in the differentiation between neoplasms and disorders of epithelial growth.

4335 **IDIOPATHIC MUSCULAR STRICTURES OF THE SIGMOID COLON.** *(E.)* Cassano, C. (Inst. Gen. Clin. Med., U. Rome, Italy) and A. Torsoli. *Gut* 9(3): 325-331, 1968.

Pathological findings in 2 cases of idiopathic muscular stricture of the sigmoid colon (women, 21 and 53 yr old) are presented. The most significant finding was a marked increase in thickness of the musculature with a consequent reduction in caliber of the damaged segment. In the first case, which was asymptomatic, the thickening involved both the circular and longitudinal muscle layers. There were focal inflammatory changes in the mucosa and submucosa accompanied by a circumscribed dilatation of the wall. The second case, which was characterized by severe constipation, showed muscular thickening only in the circular layer and there were no signs of inflammation. The constipation disappeared after a left hemicolectomy. It is noted that a similarity exists between the muscular changes in these two cases and the muscular changes in diverticular disease.

4336 **ORAL ANTIBIOTIC BOWEL PREPARATION AND COMPLICATIONS IN COLON SURGERY.** *(E.)* Polacek, M. A. (Marquette Sch. Med., Milwaukee, Wis.) and P. Sanfelippo. *Arch Surg* 97(3):412-417, 1968.

Of 270 consecutive open colon resections, 70% received preoperative oral antibiotic bowel preparations with mechanical cleansing enemas and low residue diets, while 30% did not receive any preoperative oral antibiotics. The second group was given parenteral antibiotics on the day of and 3 days following surgery. Complications developed in 50% of the oral antibiotic group, consisting of diarrhea (27%), wound infections (13%), intra-abdominal abscesses (7%), and anastomotic leaks (3%). Complications developed in only 10% of the other group, consisting of wound infections (8%), and abdominal abscesses (2%). No diarrhea was noted in this group. Cultures from infected wounds in patients given oral antibiotics preoperatively frequently yielded *S. aureus,* while this organism was rarely found in the wound infections of the other patients.

4337 **THE PROGNOSIS IN DIVERTICULITIS OF THE COLON.** *(E.)* Zollinger, R. W. (Dept. Surg., Ohio State U., Columbus). *Arch Surg* 97(3):418-422, 1968.

The prognosis in diverticulitis of the colon is discussed in relation to past history, principal symptoms, site, complications, and surgery on the basis of 374 patients (156 men and 218 women, most over 50 yr old) seen during an 11-yr period. The principal symptom on admission in these patients was abdominal pain (in 71%), while 43% had a history of symptoms such as localized pain (in 69%), constipation, diarrhea, bleeding, vomiting and distension, continuing in some cases for 7 yr and more. The diverticulitis was localized to the sigmoid in 75% of the cases. Complications such as perforation, obstruction or bleeding developed in 27%, and a total of 79 patients required surgery during their first admission, of whom 5 died. Eight other patients died while hospitalized, leaving 229 nonsurgical patients who were followed up for 1-11 yr. Among these, 35% had persistent symptoms of diverticulitis (pain in almost all cases), 5 later died of diverticulitis, and 8 came to surgery. These results indicate that about one third of all patients hospitalized for diverticulitis will require constant observation and care for persistently recurring symptoms. It is in such patients that an elective resection of the diseased area of the colon is indicated.

4338 **DIAGNOSIS AND NATURAL HISTORY OF GAS CYSTS OF THE COLON.** *(E.)* Moore, H. D. (Exeter City Hosp., England). *Brit Med J* 2(5604):536-537, 1968.

4339 **THE SIGMOID VOLVULUS: REVIEW OF LITERATURE AND A REPORT OF TWENTY-NINE CASES.** *(E.)* Palchoudhury, A. (B. S. Med. Coll., Bankura, West Bengal, India) and P. K. Chaudhuri. *Antiseptic* 65(6):397-402, 1968.

4340 **SOME IMPORTANT COLONIC AND RECTAL POLYPS.** *(E.)* Hawk, W. A. (Cleveland Clin. Found., Ohio), F. L. Weakley and R. B. Turnbull Jr. *Minn Med* 51(8):1063-1072, 1968.

4341 **SURGICAL TREATMENT OF DIVERTICULAR DISEASE OF THE COLON.** *(Por.)* Paulino, F. (Rio de Janeiro, Brazil), I. de Araujo Nogueira, G. Gonzalez, S. Ceotto and A. Hissa. *Hospital (Rio)* 73(6):25-44, 1968.

4342 **DIVERTICULITIS OF THE CECUM WITH CHRONIC PENETRATION AND MASSIVE HEMORRHAGE.** *(E.)* Maier, W. D. (Dept. Surg. Temple U., Philadelphia, Pa.), G. P. Sherwin and G. P. Rosemond. *Amer J Surg* 116(3):463-466, 1968.

4343 **THE SECRETORY AND EXCRETORY FUNCTIONS OF THE COLON AND THEIR DISTURBANCES.** *(E.)* Kuhn, H. A. (Med. Clin., Justus Liebig U., Giessen, Germany). *Amer J Proctol* 19(5):325-329, 1968.

4344 **NEPHROINTESTINAL FISTULA: REAPPRAISAL, REVIEW OF LITERATURE, AND REPORT ON TWO CASES.** *(E.)* Pinheiro, J. C. (City Gen. Hosp. & Med. Ctr., Kansas City, Mo.), H. N. Habib and I. M. Thompson. *Arch Surg* 97(4):609-615, 1968.

4345 **ANTIBIOTIC-COLITIS.** *(E.)* Scheibe, O. (Med. Acad. Lübeck, Germany) and E. Teubner. *Amer J Proctol* 19(5):353-356, 1968.

4346 **DEFUNCTIONING COLOSTOMY IN THE MANAGEMENT OF VESICOCOLIC FISTULA: A SIMPLE TECHNIQUE.** *(E.)* Heslop, J. F. (Park Hosp., Manchester, England), N. C. Keddie and W. H. Isbister. *Brit J Surg* 55(8):623-624, 1968.

4347 **ACUTE APPENDICITIS AS A REASON FOR EMERGENCY SURGERY IN ELDERLY PATIEN PATIENTS.** *(It.)* Pellati, M. De Vecchi (Ciceri-Agnesi Hosp., Milan, Italy), W. Rossi and F. Trupiano. *Chir Ital* 19(1):114-122, 1967.

4348 **SUCCESSFUL SURGERY FOR CARCINOMA OF THE SIGMOID IN A 92-YEAR-OLD MAN: [CASE REPORT]** *(E.)* Case, T. C. (530 Park Ave., New York City). *J Amer Geriat Soc* 16(8):948-951, 1968.

4349 **AN ENDORECTAL PULL-THROUGH OPERATION WITH PRIMARY ANASTOMOSIS FOR HIRSCHSPRUNG'S DISEASE.** *(E.)* Boley, S. J. (Montefiore Hosp. Med. Ctr., New York City). *Surg Gynec Obstet* 127(2):353-358, 1968.

4350 **LEIOMYOSARCOMA OF THE COLON—A REVISED PROGNOSIS: REPORT OF A CASE.** *(E.)* LeMole, G. (Temple U. Health Sci. Ctr., Philadelphia, Pa.), L. I. Goldman and G. P. Rosemond. *Dis Colon Rectum* 11(4):306-310, 1968.

4351 **THE EVOLUTION OF COLOSTOMY.** *(E.)* Cromar, C. D. L. (Pasadena, Texas). *Dis Colon Rectum* 11(4):256-280, 1968.

4352 **THE INCIDENCE OF BENIGN AND MALIGNANT NEOPLASMS OF THE COLON AND RECTUM: A POST-MORTEM STUDY.** *(E.)* Hughes, L. E. (Dept. Surg., U. Queensland, Brisbane, Australia). *Aust New Zeal J Surg* 38(1):38(1):30-34, 1968.

4353 **NECROSIS OF THE COLON AND THE RECTUM COMPLICATING ABDOMINAL AORTIC RESECTION.** *(E.)* Bertelsen, S. (Natl. Hosp., Copenhagen, Denmark) and K. Egeblad. *Acta Chir Scand* 134(2):151-156, 1968.

4354 **SUBMUCOSAL LIPOMA OF THE COLON.** *(Ger.)* Schlosser, D. (Surg. Clin., U. Homburg/Saar Germany) and L. Consiglio. *Bruns Beitr Klin Chir* 216(5):414-418, 1968.

4355 **NEW SURGICAL METHODS FOR CANCER OF THE LARGE BOWEL.** *(Hun.)* Kiss, J., J. Schnitzler, E. Fabian and E. Farago. *Orv Hetil* 109(28):1513-1519, 1968.

4356 **LYMPHOMA OF THE COLON SIMULATING ULCERATIVE COLITIS.** *(E.)* Friedman, H. B. (Cleveland Clin. Found., Ohio), G. M. Silver and C. H. Brown. *Amer J Dig Dis* 13(10):910-917, 1968.

4357 PERIANAL INFECTION AS THE FIRST SIGN OF CANCER OF THE LARGE BOWEL. *(E.)* Arminski, T. C. (Grace Hosp., Detroit, Mich.) and D. W. McLean. *J Abdom Surg* 10(10):252-253, 1968.

4358 THE MANAGEMENT OF DIVERTICULITIS. *(E.)* Bridges, R. M. (Minden, La.). *J Abdom Surg* 10(10):254-258, 1968.

4359 COLON ATRESIA AND HIRSCHSPRUNG'S DISEASE. *(E.)* Hyde, G. A. Jr. (U. California Sch. Med., San Francisco) and A. A. DeLorimer. *Surgery* 64(5):976-978, 1968.

4360 DIVERTICULOSIS AND DIVERTICULITIS OF THE SIGMOID COLON: A CONTRIBUTION TO THE PATHOGENESIS OF THE SCLEROSIS OF THE SIGMOID COLON. *(E.)* Reifferscheid, M. (Med. Fac., Inst. Technol., Rhineland/Westphalia, Aathen, Germany). *Digestion* 1(3):129-139, 1968.

4361 DO ADENOMATOUS POLYPS BECOME MALIGNANT? *(E.)* Kwon, S. H. (Detroit, Mich.). *Harper Hosp Bull* 26(3):113-121, 1968.

4362 SKELETAL METASTASES FROM CARCINOMA OF THE COLON. *(E.)* Nikolaidis, D. (Augusta Gen. Hosp., Me.). *J Maine Med Ass* 59(8):155-158, 1968.

4363 LESIONS IN THE AUTONOMIC NERVOUS SYSTEM OF THE HEART AND COLON OF THE MOUSE IN THE ACUTE PHASE OF EXPERIMENTAL CHAGAS' DISEASE: OPTICAL- AND ELECTRON-MICROSCOPIC STUDIES. *(Por.)* Tafuri, W. L. (Fac. Med., U. Minas Gerais, Belo Horizonte, Brazil). *Rev Ass Med Minas Gerais* 19(1):3-39, 1968.

4364 SOME RECTOSIGMOIDOSCOPIC PICTURES IN PEDIATRIC PATHOLOGY. *(Sp.)* Romer, H. (J. M. de los Rios Pediat. Hosp., Caracas, Venezuela). *GEN* 22(3):269-278, 1968.

4365 PINWORM INFESTATION OF THE APPENDIX. *(E.)* Tolstedt, G. E. (Quain & Ramstad Clinic, Bismarck, N. D.). *Amer J Surg* 116(3):454-455, 1968.

4366 NEURILEMOMA OF THE CECUM. *(E.)* Doyle, J. L. (4-G Med. Profess. Bldg., San Antonio, Texas), F. J. Bryant Jr. and P. W. Voltz Jr. *Texas Med* 64(8):42-43, 1968.

4367 PORTAL VEIN GAS COMPLICATING HIRSCHSPRUNG'S DISEASE WITH ENTEROCOLITIS. *(E.)* Verby, H. D. (Stanford U. Sch. Med., Palo Alto, Calif.), R. A. Castellino, G. W. Friedland and W. H. Northway Jr. *J Pediatrics* 73(4):599-602, 1968.

4368 DYNAMIC OR DISAPPEARING DIVERTICULA OF THE COLON. *(E.)* Herbert, W. W. (U. California Sch. Med., San Francisco). *Radiology* 91(3):508-513, 1968.

See also abstract nos.: 3892,3906,3920,4228,4381

4369 CUTANEOUS HYPERSENSITIVITY TO DEOXYRIBONUCLEIC ACID (DNA) IN PATIENTS WITH ULCERATIVE COLITIS. *(E.)* Bárta, K. (Med. Clin., Palacký U., Olomouc, Czechoslovakia) and L. Benýšek. *Digestion* 1(2):107-114, 1968.

Intradermal tests with 0.1% aqueous herring-sperm DNA (0.1 ml sterile solution at pH 7.4 injected intracutaneously on the forearm) were positive in 14 of 44 patients (23 males and 21 females, 12-74 yr-old) with ulcerative colitis of 0.5-30 yr duration (24 clinically active cases and 20 inactive) and in 0 of 45 controls; only one patient (with a positive skin test) had recently received steroids and only one (with a negative skin test) had a history of allergy (asthma). The group with positive skin tests included 10 males and 4 females, 27-74 yr-old, with ulcerative colitis of 1.5-20 yr duration (9 active cases and 5 inactive). There was no correlation between a positive skin test and the serum gamma-globulin level; nor could a positive skin test be correlated with clinical status, except that there was some predominance among elderly males. Double gel diffusion studies failed to reveal any precipitating antibodies to DNA in any of 38 sera tested. Skin biopsy in two positive reactors revealed the typical signs of a "delayed" reaction, with edema, fragmentation of the elastic fibers, collagen necrosis in the deeper corium, monocytic infiltration and perivascular eosinophils. The nature of the antigens responsible for the development of hypersensitivity is obscure.

4370 DIAGNOSIS AND MANAGEMENT OF THE MEGACOLON OF ULCERATIVE COLITIS. *(E.)* Neschis, M. (Montefiore Hosp. Med. Ctr., New York City), S. S. Siegelman and J. G. Parker. *Gastroenterology* 55(2):251-259, 1968.

Based on the radiological and clinical findings in 12 patients (4 males and 8 females, 13-65 yr old) with megacolon accompanying universal ulcerative colitis of 6 weeks - 14 yr duration, it is concluded that the best diagnostic X-ray criteria are either an abnormal transverse colon which exceeds 6.0 cm in diameter and is the most distended segment of the colon, or a subserosal radiolucent line paralleling the colon. In these 12 patients, the diameter of the transverse colon was 5.0-13.0 cm (average 8.4 cm) compared to 4.1-4.9 cm in normal subjects and ulcerative colitis patients without megacolon (in whom the cecum, ascending colon and hepatic flexure are larger); a subserosal line was seen in the 4 cases having the least distension of the transverse colon (5.0-7.0 cm). The clinical picture was variable, although all showed leukocytosis, a shift to the left, or toxic granulation of the polymorphonuclear leukocytes, and most were anemic. Treatment was by intubation of the terminal ileum (Cantor tube) for purposes of decompression, plus antibiotics (penicillin, streptomycin, achromycin, chloromycetin, erythromycin), i.v. albumin, blood transfusions, and corticosteroid therapy: ACTH (80 U/day i.v.) in 11, plus parenteral steroids (prednisolone acetate or methylprednisolone, 60-80 mg/day) in 10 of 11, and parenteral steroids alone in 1. Intubation was followed by a rapid and significant decrease in distension in 11 of 12 cases, but 7 of these 11 were operated on anyway because of massive hemorrhage or the severity of the colitis. Of the 4 who recovered on medical therapy, 3 eventually came to subtotal colectomy. Among the other 8 (7 of whom received steroids postoperatively for 10-14 days), 6 recovered completely and 2 died of sepsis and pneumonia 6-18 weeks postoperatively.

4371 SURGICAL MANAGEMENT OF ULCERATIVE COLITIS IN CHILDREN. *(E.)* Fonkalsrud, E. W. (U. California Sch. Med., Los Angeles), P. Levin and W. F. Barker. *Amer J Gastroent* 50(2):125-130, 1968.

Among 64 children (31 males and 33 females, 2 months - 18 yr old, with an average age of 14.1 yr at first admission and 11.6 yr at first symptoms) hospitalized for ulcerative colitis between 1956 and 1967 (representing over 20% of all patients with ulcerative colitis during this period), 35 were eventually subjected to colectomy because of marked growth retardation, toxic megacolon and/or acute rectal bleeding (15 of the 35 were emergency operations). All had previously received medical therapy, and 12 had received systemic steroids. The main symptoms were diarrhea (63 cases), bleeding (58), growth retardation (42), abdominal pain (33), fever (26), and anorexia (18). The family history was positive in 8 cases, and 27 showed evidence of severe environmental, social or psychological problems. The total mortality was 6.3%, including 1 death on medical therapy and 3 after surgery (2 of 3 were emergency operations). Operations performed included subtotal colectomy and ileostomy (22 cases, 12 with excellent results and 1 death), total colectomy and ileostomy (13 cases, 10 with excellent results and 1 death), late proctectomy (in 7 of those treated by subtotal colectomy, resulting in 5 excellent results and 1 death), and late ileorectal anastomosis (2 cases). Rapid weight gain followed surgery in almost every case, and all survivors eventually had at least a good result. Complications included wound infection (10 cases), persistent rectal bleeding (9), ileostomy dysfunction (6), intraabdominal abscess (6), small bowel obstruction (4), and enterocutaneous fistula (4); all the deaths and 12 of the 14 cases with postoperative complications had previously been treated with steroids. It is concluded that medical treatment consisting of a high-calorie, high-protein, low-residue diet, plus antiamebic drugs, azulfidine and psychotherapy but definitely not including corticosteroids, should be tried initially in all cases, but that surgery should not be delayed in the presence of severe growth retardation or bleeding since an ileostomy is usually well received by children. Subtotal colectomy is preferred unless the rectal segment is badly diseased, in which case careful dissection is urged to prevent nerve injury.

4372 THERAPEUTIC PROBLEMS OF ULCERATIVE COLITIS WITH HYPERTHYROIDISM. *(E.)* Powell, J. R. (U. California Med. Ctr., San Francisco), J. A. Shapiro and J. V. Carbone. *Amer J Gastroent* 50(2):116-124, 1968.

Three cases were reported in which the presence of hyperthyroidism acted to intensify the systemic manifestations of ulcerative colitis. It was noted that since colectomy in a thyrotoxic patient is accompanied by an excessive risk of morbidity and death, treatment for colitis should be nonsurgical in these patients. It was found, however, that thyroid function must be first suppressed before medical treatment of the colitis will result in any improvement. Thus the therapy of choice suggested was the extirpation of the thyroid gland with radioactive iodine together with the usual treatment for the relief of ulcerative colitis. This treatment should consist of topically and systemically administered steroids which are used for their anti-inflammatory action, and sulfonamide drugs for their effect in terminating the current attack and preventing future episodes of colitis.

4373 **FUNCTIONAL DISTURBANCES DURING REMISSIONS OF CHRONIC RECURRENT ULCERATIVE PROCTOSIGMOIDITIS AND COLITIS.** *(Ger.)* Müller-Wieland, K. (1st Med. Clin., U. Hamburg, Germany) and H. Freyberger. *Z Gastroent* 6(3):196-203, 1968.

Among 22 male and 31 female patients (average age 32.6 yr) with chronic, recurrent, ulcerative colitis or proctosigmoiditis who were followed for periods averaging 20.4 and 23.8 months, resp., after stabilization of the acute inflammatory process, 9 different types of functional disorder could be identified and defined: functional diarrhea (30 cases), functional constipation (20 cases), functional rectal bleeding (16 cases), functional mucus secretion (25 cases), functional abdominal pain (18 cases), flatulence (24 cases), functional upper-abdominal symptoms (26 cases), anorexia (18 cases), and a psychoautonomic syndrome (32 cases). Each of these disorders is analyzed in detail from the point of view of etiopathogenesis, symptomatology, prognosis, diagnosis and treatment, and it is pointed out that the result of underlying pathological alterations in intestinal motility, tone, secretion and blood supply. The disorders are all intermittent in nature and generally respond to symptomatic and supportive therapy.

4374 **THROMBOCYTOSIS IN CHRONIC INFLAMMATORY BOWEL DISEASE.** *(E.)* Morowitz, D. A. (Dept. Med., U. Chicago, Ill.), L. W. Allen and J. B. Kirsner. *Ann Int Med* 68(5):1013-1021, 1968.

Case histories are presented for 6 patients (3 males and 3 females, 13-52 yr old) with either ulcerative or granulomatous intestinal disease who developed marked thrombocytosis during a period of increased clinical activity of their bowel disorders. Although no primary hematologic disease was present, increased numbers of granulocytes and megakaryocytes were noted in the bone marrow, and platelet counts varied from 500,000 to 1.3 million per mm^3 for periods of 37-89 days. Three patients were treated with busulfan in an effort to decrease the likelihood of hemorrhage and thrombosis, and 1 untreated patient, who underwent surgery, required numerous transfusions. No other instances of hemorrhage occurred, and coagulation was normal in all patients. The cause of the thrombocytosis remains unknown, but it probably represents a bone-marrow response to chronic inflammation.

4375 **PRESERVATION OF THE ASCENDING COLON IN THE SURGICAL TREATMENT OF ULCERATIVE COLITIS.** *(E.)* Topuzlu, C. (U. Vermont Coll. Med., Burlington), W. E. Andrews, A. A. Gladstone and A. G. Mackay. *Surg Gynec Obstet* 127(4):831-836, 1968.

Operations (left colectomy and proctectomy) designed to preserve the right colon were performed in 11 selected patients with ulcerative colitis. The most common indications for operation were incapacitating and intractable rectal bleeding, diarrhea, weight loss and general debilitation. The operation to save the proximal portion of the colon was considered only when roentgenologic evidence of the disease was restricted to the area distal to the midtransverse colon, and it was performed only after intraoperative gross, and frozen-section microscopic, examination of the transverse colon at the proposed site of transection had confirmed the absence of disease at that level. Ten of the 11 patients have been followed up for one to 22 yr (10.3 yr average) without recurrence of the disease in the right colon; colostomy function was normal and all colostomies were uniformly dry. The only failure in the series was due either to misinterpretation of the frozen section or chance examination of an uninvolved section only; in this patient, a right colectomy and ileostomy were performed 8 months after the coloproctectomy. It is suggested that many more patients could be considered for right colonic preservation if operation were recommended earlier in the course of the disease. The advantages of the operation are a dry colostomy, absence of potential fluid and electrolyte disturbances, and ease in patient rehabilitation.

4376 **GUIDELINES FOR THE PARENTERAL THERAPY OF COLITIS ULCEROSA.** *(E.)* Schettler, G. (1st Med. Clin., U. Heidelberg, Germany) and Ritz. *Amer J Proctol* 19(5):330-335, 1968.

4377 **PROGNOSTIC SIGNIFICANCE OF INFLAMMATORY EOSINOPHILS FOR PREDICTING THE EFFECT OF CORTICOSTEROID THERAPY IN ULCERATIVE COLITIS.** *(Dan.)* Marcussen, H. (Munic. Hosp. Copenhagen, Denmark) and H. A. Jensen. *Ugeskr Laeg* 130(4):129-133, 1968.

4378 **TOXIC DILATATION OF THE COLON FOLLOWING BARIUM ENEMA EXAMINATION DURING THE QUIESCENT STAGE OF CHRONIC ULCERATIVE COLITIS: REPORT OF A CASE.** *(E.)* Wruble, L. D. (U. Tennessee Coll. Med., Memphis) and M. W. Bronstein. *Amer J Dig Dis* 13(10):918-924, 1968.

4379 **JUVENILE ULCERATIVE COLITIS.** *(Rev.)(E.)* Davidson, M. (Bronx-Lebanon Hosp. Ctr., Bronx, New York City). *New Eng J Med* 277(26):1408-1410, 1967.

See also abstract no.: 3888

4380 EFFECT OF PROPANTHELINE BROMIDE AND PIPENZOLATE BROMIDE UPON EXOCRINE PANCREATIC SECRETION. *(E.)*

Bock, O. A. A. (Groote Schuur Hosp., Observatory, Cape Town, S. Africa), S. Bank, I. N. Marks, M. G. Moshal, A. Groll, A. Loxton and M. Dines. *Gastroenterology* 55(2):199-203, 1968.

In 37 fasting patients (most with suspected pancreatitis but including some with duodenal ulcer, hepatitis, cirrhosis, lymphoma and diabetes), tandem pancreatic function tests (secretin, 1 U/kg i.v., followed in 60 min by pancreozymin, 1.5 U/kg i.v., the entire procedure being repeated 50 min later) revealed only slight differences between the two halves of the test unless the second half was preceded by administration of pipenzolate bromide (5 mg i.m.) or propantheline bromide (15 mg i.m.). Thus, in 16 controls, the second half showed a 13.5% increase in volume, a 3.3% increase in bicarbonate concentration, and a 1.5% decrease in amylase concentration. After pipenzolate, however (10 patients), the volume of pancreatic secretion was decreased 40% and the amylase concentration was decreased 8.2%, while the bicarbonate concentration rose by 3.7%. After propantheline (11 patients), the volume decreased by 23% and the amylase concentration by 36%, while the bicarbonate increased by 0.8%. For unknown reasons, however, the basal volumes were much higher in the patients who subsequently received anticholingerics (213.4 and 252.7 ml compared to 148.7 ml in the first group of patients), so that the decreases (to 129.6 ml and 167.2 ml, resp.) were towards normal; the basal amylase concentrations were already much lower in the patients later given anticholinergics (6.8 and 5.1 U/ml compared to 8.2 U/ml in the first group). Dryness of the mouth was reported by some patients given both drugs, but blurred vision was reported only by patients receiving propantheline.

4381 MENTAL SYMPTOMS AS AN AID IN THE EARLY DIAGNOSIS OF CARCINOMA OF THE PANCREAS. *(E.)*

Fras, I. (Mayo Clin., Rochester, Minn.), E. M. Litin and L. G. Bartholomew. *Gastroenterology* 55(2):191-198, 1968.

Psychiatric studies were performed (generally without the knowledge of the patient) in 139 suspected cancer patients, including 46 subsequently found to have carcinoma of the pancreas (the diagnosis was suspected at the time of the psychiatric interview in 22 of the 46), 64 found to have carcinoma of the colon, and 29 with some other disease (biliary, duodenal, renal or ovarian cancer, lymphoangioma, pancreatitis, cholecystitis, peptic ulcer) or no disease. The age distribution was similar in all 3 groups, and the male:female ratio was 3:1 in the pancreatic cancer group and 2:1 in the 2 control groups. The average duration of illness was 12.1 months in patients with pancreatic cancer compared to 8.4 months in controls. The Depression Rating Scale of Wechsler et al. yielded a mean total score of 63.4 ± 12.8 for the group with pancreatic cancer and 46.7 ± 12.8 for the controls. The Minnesota Multiphasic Personality Inventory also revealed higher scores on the Depression and Hypochondriasis scales for the pancreatic cancer patients. Based on psychiatric interviews, mental symptoms were present in 35 of 46 patients with pancreatic cancer (76%) compared to only 17-20% of controls, even though a history of mental illness was noted in only 3 of 46 compared to 9 of 64 patients with cancer of the colon. Mental symptoms were the first to appear in 22 cases of pancreatic cancer, preceding the first physical signs by 1-43 months (median 6 months), and mental symptoms accompanied the first physical signs in 7 other cases. It is concluded that depression, loss of ambition, anxiety and a premonition of serious illness can be useful in the early diagnosis of pancreatic cancer. Mental symptoms are so characteristic of this disease, in fact, that care is needed to distinguish these symptoms from the functional and organic psychoses and neuroses of the elderly, including especially involutional melancholia and manic-depressive psychosis.

4382 THE EFFECT OF NEOMYCIN SULFATE ON PANCREATIC LIPASE ACTIVITY. *(E.)*

Rogers, A. I. (U. Miami Sch. Med., Coral Gables, Fla.) and P. S. Bachorik. *Proc Soc Exp Biol Med* 127(4):1236-1240, 1968.

In vitro studies were made of the effect of neomycin sulfate on porcine and human lipase. Human lipase was obtained by feeding a meal containing 11% triolein, 11.2% powdered milk, and 9.2% dextrose in water to previously intubated, fasting, healthy males. Twenty to 30 ml of bile-stained aspirate were collected at 2-3C and centrifuged; the supernatant was used as the source of lipase. The incubation system consisted of 1 ml of 9% triolein substrate in 0.05 M Tris buffer containing 10 mM taurocholic acid and 1 ml of Tris buffer containing the enzyme. In test solutions, neomycin sulfate was added to give final antibiotic concentrations of 0.25, 0.50, and 1.00 mg/ml. Lipid was extracted into chloroform, using the Folch method. Neomycin sulfate solutions and porcine pancreatic lipase solutions were prepared with the Tris buffer and adjusted to pH 7.0. Studies on the emulsion stability involved incubation of assay systems with and without neomycin for 1 hr at 37C, and centrifugation. Total fat of the resulting infranatant (2 ml) was determined by the Van de Kamer method. Porcine and human lipase activities were inversely proportional, while the emulsion stability was directly proportional, to the neomycir sulfate concentration. The acetylated form of the antibiotic exerted no effect, while the addition of gum acacia (2%) reducec the effect of neomycin considerably. The bidirectional character of the effect of neomycin on lipase activity and emulsion stability may account for the divergent results of previous studies regarding neomycin-lipase interrelationships. These contradictory properties seem to reside in the free amino groups.

4383 EFFECT OF ETHIONINE ON FETAL PANCREATIC DEVELOPMENT IN THE RAT. *(E.)*

Gardner, D. F. (Div. Biol. Med. Sci., Brown U., Providence, R. I.) and R. J. Goss. *Proc Soc Exp Biol Med* 127(4):1130-1134, 1968.

Studies were made of 23 pregnant Sprague-Dawley rats (8 experimental, 15 control), injected intraperitoneally with 0.5 g/kg of dl-ethionine in physiological saline, adjusted to pH 7.4. The drug was given daily from the 14th day to the 20th day of pregnancy. On the 21st day, the fetuses were removed by laparotomy and weighed. Fetal and maternal pancreases were removed, weighed, and fixed for histological study. Maternal pancreases showed the typical degenerative changes due to ethionine. On the offspring, 3 separate effects were discussed: 1) fewer young per litter; 2) reduced fetal body weight; and 3) reduced fetal pancreas weight. Decrease in the size of the litter was attributed to ethionine-induced resorption of the fetuses since the conditions at conception were identical in both groups. Two possible mechanisms are direct effect of ethionine on fetal metabolism, and damage to maternal systems. Reduced fetal body weight was a result of possible ethionine inhibition of protein synthesis in the developing fetus, or also a depressed function of the maternal pancreas leading to nutritional deficits in the mother and consequently in the fetus. The reduced weights of the fetal pancreases were due to the time of ethionine injection when zymogen granules and secretory acini become discernible. High doses of ethionine are essential for favorable competition with methionine. Two possible mechanisms are given for the disruption of acinar structure and the decrease in zymogen levels: either ethionine actually interferes with the organization of the acini by the pancreatic epithelium, or it acts after the acini are already formed.

4384 **HEMATOLOGIC AND SEROLOGIC STUDIES IN CYSTIC FIBROSIS.** *(E.)* Caplan, A. (Case Western Res. U. Sch. Med., Cleveland, Ohio) and S. Gross. *J Pediat* 73(4):540-547, 1968.

Compared to a group of 43 age-matched normal controls, 87 children with cystic fibrosis (5-16 yr old, mean 11.6 yr) were generally shorter (138.3 cm compared to 149.6), weighed less (31.5 kg compared to 46.2), and had lower pO_2 values (40-110 mm Hg, average 77.5, compared to 90-110). The major hematopoietic changes were directly related to the severity of the pulmonary disease. Although showing moderate polycythemia, the cystic fibrosis patients had lower values for mean corpuscular hemoglobin and serum-bound iron. The blood volume was normal in relation to height, but the red cell mass was directly proportional to the degree of hypoxia. The iron-binding capacity was generally above normal, but in the group with the lowest pO_2 values both the serum-bound iron and the total iron-binding capacity were low. Iron absorption was increased, particularly in those with low serum iron levels. Pancreatic extract tended to inhibit iron absorption in both cystic fibrosis patients and controls, but there was no inhibition in those with the lowest serum-bound iron values. Administration of supplemental iron to children with cystic fibrosis is not indicated unless there is evidence of severe nutritional deficiency and/or chronic blood loss.

4385 **IMMUNOLOGICAL STUDIES OF SUBMAXILLARY SALIVA FROM PATIENTS WITH CYSTIC FIBROSIS AND FROM NORMAL CHILDREN.** *(E.)* Gugler, E. (Natl. Inst. Arth. Metab. Dis., NIH, Bethesda, Md.), J. C. Pallavicini, H. Swerdlow, I. Zipkin and P. A. di Sant'Agnese. *J Pediat* 73(4):548-559, 1968.

Comparative immunodiffusion studies on the submaxillary saliva and tissue extracts of the submaxillary glands from 10 normal control subjects and 14 patients with cystic fibrosis (12-28 yr old) revealed no significant immunological difference between the two groups. In both groups, the submaxillary gland tissue (taken at autopsy from 5 patients and 4 controls) yielded 10 specific components, 4 of which were considered to be gland specific; the only component positively identified was α-amylase. The saliva from both groups contained prealbumin, albumin, α-antitrypsin, transferrin, and IgA, IgC and IgM immunoglobulins. Except for IgA, which was significantly increased in both the submaxillary saliva and the serum of patients with cystic fibrosis, all protein fractions were present in similar amounts in the saliva from both groups. There seems to be no specific salivary antigen in patients with cystic fibrosis.

4386 **PROLIFERATIVE CYSTS OF THE PANCREAS.** *(E.)* Sawyer, R. B. (Denver, Colo.), K. C. Sawyer and J. R. Spencer. *Amer J Surg* 116(5):763-767, 1968.

Case histories are presented for 4 women (46-75 yr old) with pancreatic cystadenoma and a 58-yr-old woman with pancreatic cystadenocarcinoma seen during a 20-yr period. Complaints ranged from slight tenderness to severe pain. Diagnosis usually followed exploratory surgery which was preceded by X-ray examination of the upper left quadrant. Pathologic examination of the cystadenomas revealed a multilocular, cystic, mass with a ropy, mucinous content. The cystadenocarcinoma was a cystic structure containing thick, yellowish-brown to light-green fluid. The cyst contained clusters of undifferentiated pleomorphic cells which extended, in places, through the entire thickness of the cyst wall (2-15 mm). Although the origin of these neoplasms is uncertain, they appear most often in middle-aged women in the 5th and 6th decades. Total surgical excision, rather than simple drainage, should usually be performed for cystadenomas because the majority of the lesions, which are potentially malignant, are in distal sites and are rarely bound to adjacent structures. Cystadenocarcinomas should also be excised whenever possible since they are often encapsulated and are usually slow-growing.

4387 **CYSTADENOCARCINOMA OF THE PANCREAS.** *(E.)* Warren, K. W. (Lahey Clin. Found., Boston, Mass.) and K. J. Hardy. *Surg Gynec Obstet* 127(4):734-736, 1968.

The 993 pancreatic operations performed at the Lahey Clinic during a 40-yr period included 17 for histologically-diagnosed cystadenocarcinomas in patients (11 women and 6 men, 23-77 yr old) presenting with abdominal pain (13), weight loss (13), diarrhea (3), a palpable mass (14), jaundice (5), a pancreatic fistula from a previous operation (3), preoperative diabetes mellitus (2), postoperative diabetes mellitus (2), gallstones (2), and peptic ulceration (2). Vomiting, alcoholism, narcotic addiction, and pancreatitis were absent. Marsupialization, cholecystostomy, cholecystoduodenostomy, and abdominal exploration had previously been performed in 6 patients. The cysts, which had firm walls of up to 0.2 cm in thickness, lined by cuboidal cells, and which usually contained mucoid and sometimes cloudy fluid, were multilocular in 9 patients and unilocular in 7. At the time of operation, 9 patients had no metastases, 4 had metastases to the liver, 3 had metastases to the lymph nodes, 3 had metastases to the peritoneum, 2 had metastases to the lesser omentum, and 1 had metastases to the left kidney. Radiotherapy was administered in addition to surgery in 2 patients and as a palliative measure in 1 patient. Since results with pancreatic resection were good (4 out of the 7 patients who had pancreatic resection have lived for 5 or more yr, and 2 out of the 7 are alive less than 5 yr after resection without apparent recurrence), and results with other operative procedures were poor, pancreatic resection is strongly recommended in all cases of cystadenocarcinoma of the pancreas.

4388 HETEROTRANSPLANTATION OF THE PANCREATIC ISLET CELL MASS FROM SHEEP TO DOGS. *(E.)* Pepin, J. (Hahnemann Med. Coll., Philadelphia, Pa.), K. Eto, J. M. Howard and F. W. Pairent. *Arch Surg* 97:118-123, 1968.

Eleven sheep from a colony of 13 were subjected to division and ligation of the pancreatic ducts at their entrance into the duodenum. Two sheep remained as controls, one of which was used as the donor of an unligated pancreas. Glucose tolerance tests and serum insulin measurements were carried out at weekly intervals. After ligation, fibrosis of the pancreas and destruction of the acini ensued, but ligation had little effect on glucose tolerance for the 12-15 weeks that the sheep remained in the colony. A weight loss was observed in the majority of the sheep. Twelve mongrel dogs which had been subjected to total pancreatectomy 2-3 days before, were reoperated on and a sheep pancreas was transplanted as a heterograft by vascular anastomosis. The donor's superior mesenteric artery and portal vein were anastomosed with the femoral vessels of the dog. At autopsy, the anastomoses showed thrombosis in every case. Following pancreatectomy, the blood glucose levels rose above 200 mg%, although serum insulin remained at a normal level. After transplantation, the glucose level remained high and the insulin level did not increase, but no insulin was administered. Despite immunosuppressive therapy, which began after pancreatectomy and included azathioprine (2 mg/kg p.o.) and prednisolone (40 mg daily i.m.), a functional graft was not attained. Rejection was most severe in the dog with the unligated pancreas.

4389 PANCREOZYMIN SECRETIN TEST OF EXOCRINE PANCREATIC FUNCTION IN CYSTIC FIBROSIS AND THE SIGNIFICANCE OF THE RESULT FOR THE PATHOGENESIS OF THE DISEASE. *(E.)* Hadorn, B. (Royal Children's Hosp., Melbourne, Australia), P. G. Johansen and C. M. Anderson. *Canad Med Ass J* 98(8): 377-385, 1968.

Pancreozymin-secretin tests were performed on 10 children with cystic fibrosis of the pancreas who did not show any clinical symptoms of exocrine pancreatic insufficiency. After overnight fasting, duodenal intubation was performed and pancreatic secretion was stimulated with i.v. injections of 2 U pancreozymin/kg body weight followed 20 min later by 2 U secretin/kg. The pancreatic secretion from these 10 patients was scanty and viscid, which differs from the type of secretion observed in adult pancreatitis. The results showed that water and bicarbonate secretion is more severely affected than enzyme secretion so that small amounts of pancreatic juice were secreted with a very low bicarbonate content but abnormally high enzyme concentrations. A hypothesis for the pathogenesis of cystic fibrosis is suggested using the concept that, in most exocrine glands, two different types of secretion contribute to the final secretory product: a highly concentrated secretion containing organic substances and a more dilute secretion containing mainly electrolytes. During the secretory process, the organic constituents of the first type of secretion are diluted by the electrolyte-containing fluid of the second secretion. Evidence is presented that the pathological features in the pancreas in cystic fibrosis could result from the failure to produce an adequate amount of electrolyte-containing fluid, and it is suggested that the changes occurring in the other organs affected by the disease may result from a similar phenomenon.

4390 PANCREATITIS. V. *(E.)* White, T. T. (Seattle, Washington), J. Murat and A. Morgan. *Northwest Med* 67(8):731-734, 1968.

Four case histories are presented to demonstrate the importance of immediate surgical management of a mass in the head of the pancreas. A 71-yr-old woman had an extensive pancreatic carcinoma invading both celiac ganglia, which were blocked at surgery with injections of 5 ml absolute alcohol to control the pain. A gross pancreatic carcinoma in a 71-yr-old man with metastasis to the regional lymph nodes was relieved by decompressing the pancreatic and bile ducts (pancreaticojejunostomy) without infiltrating the ganglia. Vagotomy is not recommended since it often produces crippling diarrhea or severe gastric stasis. Biopsies of enlarged nodes surrounding the pancreas (which may be present in either carcinoma or pancreatitis) should be taken along with specimens from nodes around the distal common bile duct and adjacent areas. Direct open biopsy of the pancreas is not recommended since one can be misled by a diagnosis of chronic pancreatitis behind a carcinoma; open or needle biopsy may produce an iatrogenic pancreatic fistula. A Roux-en-Y cholecystojejunostomy relieved the jaundice of a 55-yr-old woman after biopsy of adjacent nodes was negative. Peritoneal implants of adenocarcinoma were found 10 months later; alcohol block of the celiac ganglia relieved her pain until she expired. An anastomosis of the gallbladder to a loop of jejunum was performed in a 72-yr-old man since a carcinoma was suspected even though biopsy of the lymph nodes was negative. Reexamination 6 months later showed a stone in the gallbladder rather than a carcinoma to be the disorder. In inoperable lesions of the pancreas, the biliary tree is decompressed by a cholecysto- or choledocho-enterostomy, or a gastroenterostomy if the duodenum is obstructed. It is suggested that when the main pancreatic duct is dilated, it should be anastomosed over a T-tube to the jejunal loop to eliminate the pain of ductal distension. Direct alcohol injection or resection of the pain pathways at surgery is preferred to a postoperative injection by the anesthesiologist.

4391 PSEUDOCYSTS OF THE PANCREAS. *(E.)* Becker, W. F. (Louisiana State U. Sch. Med., New Orleans), H. S. Pratt and H. Ganji. *Surg Gynec Obstet* 127(4):744-747, 1968.

Pancreatic pseudocysts were evaluated in 104 patients (67 males and 37 females, 4-84 yr old) with reference to causation, clinical and roentgenographic features, nonoperative complications and therapeutic results. The cyst developed as a complication of pancreatitis in 96 patients. Important symptoms included pain in 91 patients, anorexia in 65, nausea in 61, vomiting in 54, weight loss in 42, abdominal tenderness in 65, abdominal mass in 58, fever in 53, jaundice in 13 and pleural effusion in 5. Roentgenographic signs were largely a result of pressure on contiguous structures. Associated diseases of major importance included pancreatitis in 71 patients, biliary tract disease in 26, trauma in 25, alcoholism in 18, diabetes mellitus in 10, and carcinoma of the pancreas in 4. The pseudocyst was first discovered at autopsy in 11 patients. Primary operation was performed in 92 patients as follows: 12 patients received complete excision (3 died), 53 had external drainage (3 died) and 27 had internal drainage (13 cystogastrostomy of whom 2 died, 11 cystojejunostomy, 3 cystoduodenostomy). Operation is recommended for most patients having a pancreatic pseudocyst since regression is rare. In 44 patients at least one major complication developed that was directly related to the pseudocyst (infection in 28, perforation in 10, hemorrhage in 11, obstructive jaundice in 3, and intestinal obstruction in 2. Size, location, accessibility of the cyst and its approximation to contiguous vital structures, the maturity of the cyst wall, the consistency of the cyst contents, the presence or absence of communication with the pancreatic ductal system or of pancreatic disease, and the general condition of the patient are some of the major factors influencing the choice of operational procedure.

4392 **ACUTE "IDIOPATHIC" PANCREATITIS: A POST-MORTEM ETIOLOGICAL STUDY.** *(E.)* Moberg, A. (Karolinska Hosp., Stockholm, Sweden), K. Svenhamn and J. Wagermark. *Acta Chir Scand* 134(5):369-372, 1968.

A survey of 8179 autopsies revealed 105 subjects (51 males and 54 females) with signs of acute pancreatitis. After eliminating subjects with cholelithiasis, alcoholism, generalized infections, a history of endocrine diseases or therapy, and lesions in the pancreatic vessels, there remained a group of 12 patients with "idiopathic" pancreatitis. The average age of these 12 patients was 75.7 yr compared to 65.4 yr for subjects in the "cholelithiasis-alcoholism" group (86 patients of whom 18 were recognized clinically). Nine of the 12 patients died in direct or close connection with an acute cardiovascular accident (4 of myocardial infarction, 4 of pulmonary emboli and 1 of cerebral infarction). Two other subjects had showed signs of cardiosclerosis. Cardiovascular accidents occurred in 75% of the idiopathic group and in 33% of the "cholelithiasis-alcoholism" group. It is felt that the difference is too marked to be explained merely by age differences between the 2 groups. It is proposed that the idiopathic pancreatitis was caused by a combination of stenosing atheromatosis in pancreatic vessels and shock. Thus, the pancreatitis was not "idiopathic" but was induced on a vascular basis.

4393 **FATAL HYPOGLYCAEMIA IN RATS FOLLOWING TOTAL PANCREATECTOMY COMBINED WTIH PARTIAL HEPATECTOMY.** *(E.)* Sutton, P. M. (University Med. Sch., London, England) and A. Taghizadeh. *Lancet* 2(7570):712-714, 1968.

4394 **CELL INFILTRATIONS IN THE PANCREAS OF NEWBORN INFANTS OF DIABETIC MOTHERS.** *(E.)* Pedersen, L. M. and I. Tygstrup. *Acta Path Microbiol Scand* 73(4):537-548, 1968.

4395 **RADICAL PANCREATECTOMY FOR HYPOGLYCEMIC TUMOR OF THE ISLES OF LANGERHANS.** *(Fr.)* Mercadier, M. (Pitie Hosp., Paris, France), J. P. Clot and P. Vayre. *Ann Chir* 22(11/12):789-794, 1968.

4396 **CARCINOMA OF THE PANCREAS IN ASSOCIATION WITH CHRONIC PANCREATITIS.** *(E.)* Weinstein, E. C. (Granada Hills, Calif.). *J Amer Geriat Soc* 16(8):952-955, 1968.

4397 **QUANTITATIVE DETERMINATION OF BETA-GLUCURONIDASE IN SWEAT GLAND AND OTHER SKIN COMPONENTS IN CYSTIC FIBROSIS.** *(E.)* Gibbs, G. E. (U. Nebraska Coll. Med., Omaha) and G. D. Griffin. *J Invest Derm* 51(3):200-203, 1968.

4398 **PRIMARY SARCOMA OF THE PANCREAS.** *(E.)* Neibling, H. A. (Long Beach, Calif.). *Amer Surg* 34(9):690-693, 1968.

4399 **FORMATION OF SECRETORY GRANULES IN PANCREATIC ISLET B CELLS OF CORTISONE-TREATED RABBITS.** *(E.)* Bencosme, S. A. (Kingston Gen. Hosp., Ontario, Canada) and A. Martinez-Palomo. *Lab Invest* 18(6):746-756. 1968.

4400 **THE SYMPTOMS, DIAGNOSIS AND THERAPY OF CARCINOMA OF THE PANCREAS.** *(Ger.)* Heisig, N. (1st Med. Clin., U. Hamburg, Germany). *Z Gastroent* 6(3):163-174, 1968.

4401 **SURGICAL MANAGEMENT OF TRAUMATIC INJURIES TO THE PANCREAS.** *(E.)* Werschky, L. R. (VA Hosp., Houston, Texas) and G. L. Jordan Jr. *Amer J Surg* 116(5):768-772, 1968.

4402 **PATHOGENESIS AND PHYSIOPATHOLOGY OF CYSTIC FIBROSIS OF THE PANCREAS: FIBROCYSTIC DISEASE OF THE PANCREAS (MUCOVISCIDOSIS).** *(Rev.)(E.)* Di Sant'Agnese, P. A. (Natl. Inst. Arth. Metab. Dis., Bethesda, Md.) and R. C. Talamo. *New Eng J Med* 277(24):1287-1294, 1967.

4403 **PATHOGENESIS AND PHYSIOPATHOLOGY OF CYSTIC FIBROSIS OF THE PANCREAS: FIBROCYSTIC DISEASE OF THE PANCREAS (MUCOVISCIDOSIS).** *(Rev.)(E.)* Di Sant'Agnese, P. A. (Natl. Inst. Arth. Metab. Dis., Bethesda, Md.) and R. C. Talamo. *New Eng J Med* 277(25):1323-1329, 1967.

4404 **PATHOGENESIS AND PHYSIOPATHOLOGY OF CYSTIC FIBROSIS OF THE PANCREAS: FIBROCYSTIC DISEASE OF THE PANCREAS (MUCOVISCIDOSIS).** *(Rev.)(E.)* Di Sant'Agnese, P. A. (Natl. Inst. Arth. Metab. Dis., Bethesda, Md.) and R. C. Talamo. *New Eng J Med* 277(26):1399-1408, 1967.

4405 **DETERMINATION OF THE BORDERS OF INVOLVEMENT IN CANCER OF THE PANCREAS.** *(Rus.)* Mikhailichenko, V. A. and N. M. Rovenskaya. *Klin Khir* (8):1-4, 1968.

4406 **CLINICO-MORPHOLOGICAL PARALLELS IN ACUTE NECROSES OF THE PANCREAS.** *(Rus.)* Zaitsev, G. P. and V. T. Pozdniakov. *Klin Khir* (8):5-8, 1968.

4407 **SOME PHYSIOLOGICAL OBSERVATIONS ON THE EXOCRINE PANCREAS: THE EFFECTS OF SOME AGENTS ON PANCREATIC SECRETION.** *(E.)* Nakano, S. (Nagoya U. Sch. Med., Japan). *Nagoya J Med Sci* 31(1):79-116, 1968.

See also abstract nos.: 3785,3896,3898,3916,4308

4408 **STUDIES OF HEMORRHAGIC PANCREATITIS IN GERM-FREE DOGS.** *(E.)* Nance, F. C. (Louisiana State U. Sch. Med., New Orleans) and J. L. Cain. *Gastroenterology* 55(3):368-374, 1968.

Acute hemorrhagic pancreatitis was produced by the Pfeffer technique (construction of a closed duodenal loop followed by gastrojejunostomy and ligation of the common bile duct) in 12 of 15 conventional and 5 of 7 germ-free adult dogs of both sexes. All the conventional animals were dead or moribund within 24 hr, but autopsy showed that 3 did not have pancreatitis (2 of these 3 had perforated duodenal loops). The 5 germ-free animals which developed acute pancreatitis were dead or moribund within 30 hr; of the other 2, one was found to have interstitial pancreatitis and the other had pancreatic atrophy and a perforated duodenal loop. The gross and histological appearance of the pancreas were identical in the two groups of animals, except that the germ-free dogs yielded negative cultures and the accumulated fluid was odorless. Cultures from the duodenum in the conventional animals yielded *Clostridia* in most, *Streptococci* and *Lactobacilli* in many, and (from the duodenal loop only) *E. coli, Enterococci* and *Proteus.* It is concluded that bacteria are not a primary factor in the pathogenesis of this type of experimental pancreatitis, the initiating factor in which is probably the reflux of activated pancreatic enzymes from the duodenum into the pancreatic duct.

4409 **SURGICAL TREATMENT OF CHRONIC RELAPSING PANCREATITIS.** *(E.)* Haynes, C. D. (Emory U. Sch. Med., Atlanta, Ga.) and S. L. Sanders. *Southern Med J* 61(8):822-825, 1968.

Among 250 cases of acute pancreatitis seen at Grady Memorial Hospital in Atlanta, Georgia during a 10-yr period, 187 were admitted once, 38 were admitted twice, and 25 were admitted more than twice, due mostly to obstruction of the pancreatic ducts. Case histories are presented here for 4 such patients (3 men and 1 woman, 34-47 yr old). Two alcoholic males presenting with obstruction at the ampulla of Vater were treated by cholecystectomy plus either sphincteroplasty or choledochojejunostomy. A Negro woman with an obstruction in the duct of Wirsung received sphincteroplasty and a longitudinal pancreaticojejunostomy, and a man with multiple obstruction of the major, secondary and tertiary ducts was treated by 95% pancreatectomy and choledochoduodenostomy. It is concluded that no operative procedure is ideal and that individualized surgery to provide adequate drainage of the obstructed ducts is imperative in all cases. If obstruction is limited to the main pancreatic duct, then either sphincteroplasty or longitudinal pancreaticojejunostomy may suffice, but if the secondary and tertiary pancreatic ducts are also obstructed, a subtotal pancreatectomy will probably be necessary.

4410 **PANCREATITIS AFTER BILIARY TRACT SURGERY.** *(E.)* Bardenheier, J. A. III (St. Louis U. Hosp., Mo.), D. L. Kaminski and V. L. Willman. *Amer J Surg* 116(5):773-776, 1968.

Among 840 patients subjected to cholecystectomy at St. Louis University Hospital from January 1955 through December 1965, 32 (4%) developed postoperative acute pancreatitis and another 52 (9.5% of the 547 patients in whom postoperative amylase levels were routinely measured) developed hyperamylasemia without clinical signs of pancreatitis. Postoperative pancreatitis developed in 18 (21.2%) of the 85 patients with previous histories of pancreatitis, in 16 (2.1%) of the 755 patients with no previous history of pancreatic disease, in 12 (1.8%) of the 660 patients undergoing simple cholecystectomy, and in 22 (12.2%) of the 180 patients undergoing cholecystectomy with common duct exploration. Similarly, hyperamylasemia developed in 33 (40.2%) of 82 patients with previous pancreatic disease, in 53 (11.4%) of 465 patients with no history of pancreatic disease, in 35 (9.3%) of 377 patients undergoing simple cholecystectomy and in 51 (30%) of 170 patients undergoing cholecystectomy with common duct exploration. The numbers of patients presenting with postoperative pancreatitis and hyperamylasemia after operative cholangiography, with or without reflux of contrast agent into the pancreatic duct, were insignificant. Death occurred in 22 out of the 840 patients: 8 due to postoperative pancreatitis (1 after cholecystectomy and 7 after cholecystectomy with common duct exploration), 7 due to severe coexisting disease, and 7 due to other causes. Common duct exploration and a preoperative history of pancreatitis are important predisposing factors to the development of pancreatitis after biliary tract surgery.

4411 **THE ROLE OF BACTERIA IN HEMORRHAGIC PANCREATITIS.** *(E.)* Williams, L. F. Jr. (Boston City Hosp., Mass.) and J. J. Byrne. *Surgery* 64(5):967-972, 1968.

Studies on a total of 260 dogs showed that the ability of "Pfeffer fluid" (fluid obtained from the closed duodenal loops of dogs 24 hr after the Pfeffer operation with ligation of the common bile duct) to produce severe hemorrhagic pancreatitis when infused into the canine pancreatic duct under a pressure of 600 mm saline was completely abolished by heating to 56C for 30 min, and significantly reduced by incubation with either tetracycline (1 g) or cortisone (100 mg) for 1 hr at room temperature. The fluid could also be rendered relatively nontoxic by placing 1 g of tetracycline in the closed duodenal loop at the time of surgery, but pancreatitis could not be prevented by i.v. infusion of tetracycline (1 g/liter) into the recipient dogs following infusion of Pfeffer fluid into the pancreatic ducts. No pancreatitis was produced by pancreatic duct infusion of *E. coli* (10^7-10^8 cells), blood, trypsin (10 mg), or *E. coli* endotoxin (10 mg) alone, or of blood and trypsin, *E. coli* and blood, endotoxin and trypsin, endotoxin and hemoglobin, or endotoxin, casein and trypsin together. Some pancreatitis was produced by pancreatic duct infusion of *E. coli* and trypsin or of endotoxin and either blood, plasma or hemolyzed red blood cells (all incubated for 24 hr before infusion), but severe pancreatitis could be produced only by pancreatic duct infusion of *E. coli* (or its endotoxin), blood and trypsin following preincubation at 37C for 24 hr. The toxic effect of such "artificial Pfeffer fluid" could be abolished by addition of desoxycholate (which degrades the endotoxin) but not by addition of cortisone. It is concluded that the interaction of *E. coli* endotoxin with blood and trypsin, taking place over a period of several hours, produces some factor or factors which can cause hemorrhagic pancreatitis.

12 **THE ROLE OF ELASTASE IN ACUTE HEMORRHAGIC PANCREATITIS IN MAN.** *.)* Geokas, M. C. (U. South. California Med. Sch., Los ngeles), H. Rinderknecht, V. Swanson and B. J. Haverback. *ab Invest* 19(2):235-239, 1968.

eterminations of free elastase and proelastase, chymotrypsin, ıymotrypsinogen, and free trypsin-like activity, together with istologic studies, were performed on the head and tail of ancreases removed 8-96 hr postmortem from 24 control atients (6 women and 18 men with an average age of 42 yr ho died of causes other than pancreatitis, protracted shock r anoxia, acidosis, pancreatic tumors, or diabetes mellitus) and n the head, body, and tail of pancreases obtained 8-36 hr ostmortem from 6 patients (2 women and 4 men with an average age of 46 yr) who died of acute hemorrhagic pancreatitis. hile no elastase was found in either the head or tail of the ontrol pancreases, averages of 10 ± 3.4, 12 ± 4.1, and 11 ± 4.3 g/g wet tissue were found in the head, body, and tail of panreatitic pancreases, resp. Pancreases from pancreatitis patients lso showed significantly more trypsin and less chymotrypsinogen nd proelastase, while the chymotrypsin concentration was about he same as in controls. Thus, most of the proteolytic activity as found in free form in pancreatitis patients and in bound orm in controls. Destruction of elastic tissue of the intraancreatic vessel walls was seen only in tissue from pancreatitis atients. The evidence suggests that elastase plays an important ole in producing the vascular injury of acute hemorrhagic ancreatitis in man.

413 **CHRONIC PANCREATITIS AND CHOLEDOCHODUODENAL ANASTOMOSIS.** *(E.)* eclík, M. (Fac. Gen. Med., Charles U., Prague, Czechoslovakia), . Frič, V. Šmat and V. Friedberger. *Gut* 9(3):311-315, 1968.

he effectiveness of choledochoduodenal anastomosis in the reatment of chronic pancreatitis was studied in 80 patients, 0 with chronic pancreatitis and 40 without. It was assumed hat if biliary-digestive anastomosis released pressure within the bile ducts and the pancreatic ducts, the serum enzyme ctivity after stimulation in patients with pancreatitis treated y anastomosis should not differ from that in controls. However, there was an equal rise of pancreatic serum enzymes after secretin stimulation in both patients with chronic pancreatitis who had undergone choledochoduodenal anastomosis and those who had not had the anastomosis. It therefore appeared that the anastomosis did not eliminate the obstruction to the flow of pancreatic juice. Nevertheless, the procedure did have a favorable effect on the clinical course of the disease.

4414 **THE SURGICAL TREATMENT OF PANCREATITIS.** *(Fr.)* Guillemin, M. G. *J Med Lyon* (1120):797-809, 1967.

4415 **RADIOLOGICAL TREATMENT IN CHRONIC PANCREATITIS.** *(Fr.)* Bret, M. P. *J Med Lyon* (1120):782-789, 1967.

4416 **CHRONIC PANCREATITIS: A DEVELOPMENTAL AND DIAGNOSTIC CLINICAL STUDY.** *(Fr.)* Pasquier, M. J. *J Med Lyon* (1120):777-781, 1967.

4417 **ACUTE PANCREATITIS.** *(Fr.)* Saubier, E. C. *J Med Lyon* (1120):768-776, 1967.

4418 **MEDICAL TREATMENT OF PANCREATITIS.** *(Fr.)* Paliard, P. *J Med Lyon* (1120):790-791, 1967.

4419 **SURGICAL TREATMENT OF PANCREATITIS.** *(Sp.)* Santos, M. (Surg. Dept., U. Chile, Valparaiso), F. Hermosilla, S. Puente and G. Alfaro. *Bol Hosp Vina Mar* 22(3-4):68-76, 1966.

4420 **SURGICAL TECHNIQUES IN CHRONIC PANCREATITIS WITH AND WITHOUT CALCIFICATION.** *(Ger.)* Vossschulte, K. (Surg. Clin., Giessen U., Germany) and E. Wagner. *Munchen Med Wschr* 110(29):1704-1711, 1968.

4421 **ALLERGIC SHOCK FOLLOWING TREATMENT WITH PROTEASE INHIBITORS. [CASE REPORT]** *(Ger.)* Gregori, P. (Schleiz Distr. Hosp., Germany). *Med Klin* 62(48):1868-1869, 1967.

4422 **PROPOSED REGIMEN FOR THERAPY OF REFRACTORY SHOCK IN ACUTE PANCREATITIS.** *(E.)* Spier, N. (North Shore Hosp., Manhasset, N. Y.). *New York J Med* 68(4):527-531, 1968.

4423 **FISTULAS OF THE GASTRO-INTESTINAL TRACT IN ACUTE PANCREATITIS.** *(Rus.)* Lashchevker, V. M. *Klin Khir* (8):8-9, 1968.

4424 **PANCREATITIS.** *(E.)* Ingelfinger, F. J. (New Eng. J. Med., Boston, Mass.). *Med Coll Virginia Quart* 4(1):4-9, 1968.

4425 **ANALYSIS OF EXPERIENCE IN THE TREATMENT OF ACUTE PANCREATITIS DURING THREE CONSECUTIVE YEARS IN THE VALPARAISO WELFARE CLINIC AND ON THE SURGICAL SERVICE OF VALPARAISO HOSPITAL.** *(Sp.)* Pinilla C., J. (Valparaiso Hosp., Chile), A. Leon G. and C. L. Gonzalez I. *Bol Hosp Vina del Mar* 22(3/4):59-64, 1966.

4426 **ATYPICAL MYOCARDIAL NECROSIS WITHOUT A CORONARY LESION OCCURRING DURING AN ACUTE ATTACK OF RECURRENT PANCREATITIS.** *(Fr.)* Delaye, J. (Lyon, France), R. Loire, E. Estour, J. P. Delahaye and A. Gonin. *Lyon Med* 219(10):765-791, 1968.

4427 **AMYLASEMIA IN THE IMMEDIATE POSTOPERATIVE PERIOD FOLLOWING ABDOMINAL SURGERY.** *(Sp.)* Seijas, C., G. (Carlos J. Bello Hosp., Caracas, Venezuela), L. E. Sanabria G. and J. R. Poleo. *GEN* 22(3):209-214, 1968.

4428 **PANCREATITIS DUE TO MUMPS.** *(E.)* Witte, C. L. (USAF Hosp., Scott Air Force Base, Belleville, Ill.) and B. Schanzer. *JAMA* 203(12):1068-1069, 1968.

4429 **ACUTE PANCREATITIS AND HYPOGLYCEMIA.** *(E.)* Laraya-Cuasay, L. R. (U. Louisville Sch. Med., Kentucky), R. Wolfe and W. T. Hughes. *Clin Pediat* 7(9):525-528, 1968.

4430 **THE PATHOGENESIS OF GALLSTONE PANCREATITIS.** *(Rev.)(E.)* Trapnell, J. E. (Southmead Hosp., Bristol, England). *Postgrad Med J* 44(513) 497-500, 1968.

4431 **A FRESH APPROACH TO THE PATHOGENESI OF PANCREATITIS.** *(E.)* McCutcheon, A. (Alfred Hosp., Melbourne, Australia). *Gut* 9(3):296-310, 196

See also abstract nos.: 3672,3908,3909,4558

LIVER AND BILIARY TRACT

GENERAL

32 ELECTRON MICROSCOPIC OBSERVATIONS ON THE HUMAN SECONDARY LIVER MYLOIDOSIS.

(E.) Patriarca, P. (Inst. Gen. Path., U. rieste, Italy) and N. Carulli. *Digestion* 1(2):85-93, 1968.

liver biopsy specimens taken with a Menghini needle from 48-yr-old woman with multiple myeloma, light microscopy evealed an abundant deposition of amyloid between the parenhymal cells and the wall of the sinusoids. Electron microscopy f the same specimens revealed amyloid having a fibrillar tructure in the Disse spaces, as well as amyloid-like filaments ithin both the hepatic parenchymal and (less frequently) the ndothelial cells. The presence of amyloid in the subendothelal space confirms the hypothesis that it is produced by the epatic cells themselves, rather than being derived from the lood. It is believed that the endothelial cells play a subordinate role in the process of amyloid degeneration.

433 LIMITING FUNCTIONS OF A PRESERVED LIVER HOMOGRAFT.

(E.) Mieny, C. J. (U olorado Med. Sch., Denver), J. Homatas, A. R. Moore and . Eiseman. *Gastroenterology* 55(2):179-182, 1968.

When hepatectomized pigs were given allogenic orthotopic liver transplants using livers preserved by perfusion with cold (10C), heparinized, oxygenated blood (diluted to a hematocrit of 15% with 1:1 lactate-Ringer's solution and dextran), long-term survival was only achieved with transplants perfused for up to 8 hr, even though *in vitro* liver function was maintained for as long as 18-36 hr of perfusion under the same conditions. No immunosuppressants were employed, but 18 of the pigs received epsilon-aminocaproic acid (EACA, 1 g/kg/hr) in order to combat bleeding. Post-transplantation bleeding diathesis developed in 1 of 7 pigs given transplants perfused for 6 hr (6 pigs survived for 3-42 days), 1 of 3 pigs given transplants perfused for 8 hr (successfully controlled with EACA), all 7 pigs given transplants perfused for 18-24 hr and not given EACA, 6 of 8 pigs given transplants perfused for 18-24 hr and treated postoperatively with EACA (all died within 36 hr, 2 of ascites), and 2 of 9 pigs given transplants perfused for 18-24 hr and treated with EACA beginning 30 min before surgery (all died within 24 hr, 6 of ascites and 1 of small bowel obstruction). Post-transplantation hemorrhagic diathesis can therefore be controlled by EACA, but after hemostasis is achieved in such recipients of marginally preserved livers, persistent ascites due probably to a functional postsinusoidal obstruction becomes the limiting sign of hepatic dysfunction.

4434 ALCOHOL-INDUCED HYPOGLYCAEMIA IN CHRONIC ALCOHOLICS WITH LIVER DISEASE.

(E.) Hed, R. (South. Hosp., Stockholm, Sweden) and A. Nygren. *Acta Med Scand* 183(6):507-510, 1968.

Ingestion of 40 ml of 96% ethanol (diluted to 15-35% with water) after a 44-hr fast was followed by pronounced hypoglycemia in all 5 controls tested but in only 4 of 14 chronic alcoholics (11 men and 3 women, 31-60 yr old, including 10 with portal cirrhosis and 3 with fatty livers); 2 of these 4 (including one who developed hypoglycemia after fasting alone) also showed persistent hypoglycemia after i.v. tolbutamide (1 g in 2 min). Two other alcoholics showed transitory hypoglycemia after alcohol, although one of these had overt diabetes, but the other 8 showed no hypoglycemic response. Glucagon (1 mg i.m. 3 hr after the alcohol) produced no significant rise in blood sugar in controls, but produced a significant rise in both cases with transitory alcoholic hypoglycemia and in 7 of the 8 unresponsive cases. The oral glucose tolerance test (1.5 g glucose/kg) was diabetic in 5 of these 8 cases, while 3 of 8 showed a diabetic response to i.v. tolbutamide. It thus appears that alcoholic liver disease accompanied by decreased glucose tolerance, as in cirrhosis, may be connected with increased resistance to the hypoglycemic effect of alcohol.

4435 INFECTIONS IN RECIPIENTS OF LIVER HOMOGRAFTS.

(E.) Fulginiti, V. A. (U. Colorado Sch. Med., Denver), R. Scribner, C. G. Groth, C. W. Putnam, L. Brettschneider, S. Gilbert, K. A. Porter and T. E. Starzl. *New Eng J Med* 279(12):619-626, 1968.

Infectious complications seen in 17 patients who received liver homografts between May 1963 and May 1968 are described and suggestions are made for improving the prognosis following liver transplantation. All 8 patients (7 males and 1 female, 13 months - 67-yr-old) treated before July 1967 (including 6 with orthotopic transplants and 2 with heterotopic auxiliary transplants) died within 34 days, due in 7 cases to 29 separate progressive infections caused by gram-negative rods. *Candida albicans* and cytomegalovirus. All these patients received large doses of azathioprine and prednisone, in addition to which some received actinomycin C and local irradiation, and 2 received heterologous antilymphocyte globulin. The infections (mainly pneumonia, peritonitis, esophagitis, and urinary tract infections) were similar to but more severe than those usually following renal transplantation. In the 9 later cases (3 males and 6 females, including 7 infants 14-23 months of age and 2 adults aged 16 and 44 yr), all of whom received orthotopic transplants (fixed by resuture of the homograft and host triangular and falciform ligaments in the last 4 cases), donor selection was more discriminating thanks to prospective histocompatibility matching, the organs were better preserved at the time of transplant and did not show ischemia, antibiotic therapy could be given with greater consistency (including prior sterilization of the gastrointestinal tract with neomycin, polymyxin, cloxacillin and mycostatin in 2 cases), and immunosuppressive treatment was given with greater care; thus, all 9 received heterologous antilymphocyte globulin and the doses of azathioprine and prednisone were significantly reduced, as a result of which there was no depressive effect on γ-globulin and no leukopenia (5 of the 8 earlier cases had shown leukopenia). Nevertheless, the first 5 cases (all infants, none with fixed transplants) developed lobar hepatic gangrene due to gram-negative rods, secondary to delayed right hepatic artery thrombosis, 2-104 days after transplantation. These patients also developed 25 episodes of extrahepatic infection, but all were treated successfully and were not the cause of death. Two of these infants died within a few days after hepatic necrosis developed (2-3.5 months after transplantation), while 2 died later after multiple bacterial and fungal infections (4.5-6 months after transplantation) and 1 remained alive 12 months after transplantation. The last 4 cases (all receiving fixed transplants) did not develop septic liver necrosis and all have survived free of serious infection for 2-5.5

months (although 2 cases yielded *Herpes simplex* from the throat and 2 showed episodes of bacteremia due to *Escherichia coli* and *Staphylococcus albus*, resp.).

4436 IRON-BINDING PROPERTIES OF GASTRIC JUICE IN IDIOPATHIC HAEMOCHROMATOSIS.

(E.) Wynter, C. V. A. (King's Coll. Hosp., London, England) and R. Williams. *Lancet* 2(7567):534-537, 1968.

In 11 controls and 10 male patients with idiopathic hemochromatosis (9 of 10 treated by venesection), binding of iron ($^{59}FeCl_3$) to histamine-stimulated gastric juice *in vitro* decreased as the Fe concentration was increased, but varied directly with the assay volume and the hexosamine content. There was no significant difference in iron binding between the two groups, and the behavior of gastric juice was similar to that of other protein solutions (egg albumin, alkaline phosphatase from intestinal mucosa, acid phosphatase from wheat germ) or even dilute urine. Trypsin solutions, on the other hand, did not bind iron, but trypsin is positively charged at pH 8.0 while all the other proteins are negatively charged. There was also no relation between iron binding and iron absorption (2.6-13.5% in 3 of 10, 35.1-1.67.2% in 7 of 10) among the hemochromatosis patients. These results can best be explained by the formation of loose associations in which colloidal complexes of Fe (such as ferric oxide hydrates) are maintained in solution at higher pH values by a protective layer of gastric glycoprotein, rather than by either true chelation or nonspecific electrostatic attraction to a specific protein. There seems to be no evidence for a specific factor in gastric juice which binds Fe or stimulates its absorption, nor for a luminal abnormality in hemochromatosis.

4437 PIG LIVER PERFUSION FOR THE TREATMENT OF ACUTE HEPATIC COMA.

(E.) Ham, J. M. (Prince Henry Hosp., U. New South Wales, Sydney, Australia), R. C. Pirola, G. M. Davidson, S. Yarrow and R. G. Elmslie. *Surg Gynec Obstet* 127(3):543-549, 1968.

Fourteen perfusions were performed with mongrel dogs and pigs; the technique was also applied in the treatment of a 5-yr-old girl with acute liver necrosis. In donor pigs, anesthesia was induced by inhalation; the livers were washed free of blood and cooled *in situ*, with consequent reduction of the ischemic time of the normothermic liver. The perfusion circuit permitted assessment of hepatic function prior to cross circulation and ensured that adequate hepatic blood flow was maintained despite low flows from the subject. Adequate function of the livers was achieved; histologic examination of the liver by light and electron microscopy supported this view.

4438 CRYOGENIC HEPATIC SURGERY. *(E.)*

Cooper, I. S. (St. Barnabas Hosp., New York City) and T. Hirose. *J Cryosurg* 1(2):116-122, 1968.

Observations (50 cats, 20 dogs) of 300 cryogenic liver lesions and 2 techniques for cryogenic liver resection were presented. Freezing was done with a cryosurgical cannula, the size of the lesion depending on the area and temperature of the freezing tip. During the freezing and thawing process, the small capillaries and ductal system of the tissue were destroyed so that capillary bleeding did not occur upon incision of the previously frozen tissue. Arteries were not thrombosed or destroyed by the freezing process. The first cryosurgical technique describ is appropriate for thick portions of liver. The proposed incision line is frozen and converted to a solid block of ice so that a rapidly rotating electric saw can resect the liver distal to th line of incision. The second technique (appropriate for thin liver sections) uses a crushing clamp refrigerated with liquid nitrogen to freeze the desired incision line, which is then quickly thawed and closed with a double row of staples (Vor Petz stapler) to control bleeding. The distal segment can then be removed with a scissors. There is no postoperative bleedi or drainage. A case history is reported involving the successf use of the latter technique.

4439 DECREASE OF TOTAL SERUM-BILIRUBIN CONCENTRATION IN NEWBORN INFANTS AFTER PHENOBARBITONE TREATMENT.

(E.) Trolle, D. (Dept. Obstet.-Gyn., U. Copenhagen, Denmark). *Lancet* 2(7570):705-708, 1968.

A controlled study on 2806 single-born newborn infants with negative direct Coombs tests, including 2436 with a birth wei over 2500 g (average 3390 g; 808 treated and 1628 kept as c trols) and 370 with birth weights of 1001-2500 g (84 treated and 286 kept as controls), showed that phenobarbitone is effective in decreasing serum bilirubin levels during the first we of life, especially if given to both the mother (50-100 mg/day p.o. for at least 3 days before delivery) and the infant (5 mg i.m. 7-10 times during the first 3 days of life). On this regim (and considering only infants weighing over 2500 g), the percentage of infants with a serum bilirubin of 10 mg% or highe was only 5.1% compared to 22.6-23.3% in controls, 26.5% in 34 cases in which only the mother was treated (50 mg 1-3 tin less than 30 hr before delivery), 8.4% in 83 other cases in wh only the mother was treated (50-200 mg/day for at least 2 weeks), and 13.7-14.9% in 573 cases in which the infant was treated, either alone or with ineffective treatment of the moth Although the highest serum bilirubin when both mother and infant were treated effectively was 13.2 mg% (13 mg% or ove in 0.8% of such infants compared to 2.7-5.8% on other schedules of effective treatment and 12.6-14.7% in controls or infa of women treated ineffectively), the percentage of infants wit very severe jaundice was not significantly decreased in the oth treatment groups (0.7-1.2% with serum bilirubin levels above 20 mg% compared to 0.6-0.7% in controls). Among infants w birth weights of 1001-2500 g, effective phenobarbitone treatment decreased the percentage of infants with serum bilirubin levels of 10 mg% or higher from about 56% to 46%, and the percentage of infants with serum bilirubin levels of 17 mg% or higher from about 14% to 6%. There were no side effects. The effect of phenobarbitone on serum bilirubin levels is probably due to the induction of glucuronyl transferase or other enzymes in the liver microsomes.

4440 CHANGES IN SERUM HAPTOGLOBIN AND GROUP SPECIFIC COMPONENT AFTER ORTHOTOPIC LIVER HOMOTRANSPLANTATION IN HUMANS.

(E.) Kashiwagi, N. (U. Colorado Sch. Med., Denver), C. Groth and T. Starzl. *Proc Soc Exp Biol Med* 128(1):247-250, 1968.

It has been shown that three types can be identified for both the haptoglobin (Hp) and group-specific (Gc) components of the α_2 globulin serum fraction in human blood; that the types present in any individual are genetically determined; and that the phenotypes can be identified by electrophoretic techniques. The haptoglobin and group-specific components were studied in 4 infant recipients of orthotopic liver homografts and in their donors. It was found that in liver homograft recipients whose haptoglobin and group-specific component types differed from those of their respective donors, the donor phenotype permanently replaced that previously present. It was concluded that the liver retains its metabolic specificity after transplantation to a new host, and is the sole source of haptoglobin and the group-specific component.

4441 DIRECT TRAUMA TO THE LIVER AND CHANGES IN ENZYMATIC ACTIVITY. *(Ger.)*

Herfarth, C. (Surg. Clin., U. Marburg/Lahn, Germany). *Bruns Beitr Klin Chir* 216(5):460-469, 1968.

Experiments on 6 mongrel dogs of both sexes subjected to hepatic trauma while under Nembutal anesthesia (25 mg/kg i.v.) revealed a direct correlation between the extent of liver damage (as estimated after death or sacrifice 1-10 days later) and the serum glutamic-pyruvic transaminase (GPT) level 4-12 hr after the injury. The GPT and glutamic-oxaloacetic transaminase (GOT) levels increased by 3-4 times as much as the glutamic acid dehydrogenase (GLDH) levels and 8-12 times as much as the aldolase (ALD) levels in the first 4 hr. While the general pattern of change was the same for GPT, GOT and GLDH, the ALD showed a slow biphasic increase after hepatic trauma and the lactic (LDH) and succinic (SDH) dehydrogenase levels showed only transitory increases. Experiments on 6 other dogs given homologous liver homogenates i.v. showed that GPT was eliminated the least rapidly from the blood, reaching 50% of its maximal level in 24 hr compared to decreases of 70% in 12 hr for GLDH and GOT and 50% in 2 hr for LDH. Although the study of other liver enzymes might yield additional information as to the type of hepatic injury, it seems that only the serum GPT can be used to estimate the extent of liver injury 4-12 hr after trauma. Factors entering into the lack of utility of the other liver enzymes are the rapid elimination of LDH, SDH and GOT, the lack of specificity of LDH and ALD, which are also found in other organs, the low content of ALD in the liver, and the mitochondrial localization of hepatic GLDH and GOT, which inhibits their release.

4442 ABSORPTION DISTURBANCES IN LIVER DISEASES STUDIED BY MEANS OF THE NITROFURANTOIN TOLERANCE TEST. *(Ger.)*

Schmid, E. (Med. Acad., Lubeck, Germany), G. Stoffels, J. Adlung and U. Ritter. *Z Gastroent* 6(3):211-215, 1968.

Since it is known that nitrofurantoin is excreted by the tubules largely without being metabolized, the urinary excretion of nitrofurantoin was studied after both oral (200 mg) and intravenous (100 mg in 500 ml 5% glucose) administration in 15 patients with acute viral hepatitis, 11 patients with hepatic cirrhosis and portal hypertension, and 18 patients of the same age range (13-75 yr, average 44 yr) with various diseases not affecting intestinal absorption. The average percent of administered nitrofurantoin recovered in the urine in 12 hr was 65.5% and 69.2% after p.o. and i.v. administration, resp., in controls, most of the excretion occurring during the first 4 hr after i.v. administration and 8 hr after p.o. administration. In hepatitis patients, the urinary excretion of nitrofurantoin was generally above normal after i.v. administration (difference not statistically significant) and below normal after p.o. administration, particularly during the first 4 hr. A significant difference was obtained in 6 cases, in which the recovery after oral administration was only 22-40%. Most of the cirrhosis patients showed normal or even increased excretion patterns, but in 4 cases there was probably evidence of some intestinal malabsorption. There was no apparent relation between the effect on nitrofurantoin absorption and the severity of the liver parenchymal damage.

4443 QUANTITATIVE DETERMINATIONS OF THE SERUM IMMUNOGLOBULINS IN INFLAMMATORY LIVER DISEASES. II. CHRONIC INFLAMMATORY LIVER DISEASES. *(Ger.)*

Gleichmann, E. (Inst. Med., Hannover, Germany) and H. Deicher. *Klin Wschr* 46(15):793-802, 1968.

The serum IgG, IgA and IgM levels were determined in 66 patients with chronic inflammatory liver disease, 25 patients with intra- and extrahepatic biliary tract disease, and 101 patients with various other diseases using a simple radial immunodiffusion technique. Compared to average normal levels of 11.8, 2.4 and 15.7 mg/ml for IgC, IgA and total gamma globulins, resp., averages of 28.8, 10.3 and 42.1 were obtained in 14 men and 2 women with active alcoholic cirrhosis; these values compare with averages of 15.0, 3.7 and 21.0 mg/ml, resp., in 9 men with relatively inactive alcoholic chronic hepatitis or cirrhosis, 39.3, 3.1 and 45.3 mg/ml, resp., in 1 man and 12 women with active chronic "lupoid" hepatitis, 24.9, 7.7 and 34.5 mg/ml, resp., in 3 men and 5 women with intrahepatic cholangitis, 14.3, 5.1 and 21.7 mg/ml, resp., in 7 men with inflammatory fatty livers, and essentially normal values in 7 men with noninflammatory fatty livers, 1 man and 5 women with acute cholecystitis, 2 men and 7 women with obstructive jaundice, and 2 women with idiopathic jaundice of pregnancy. Serum IgM levels were moderately increased in all cases with increases in total immunoglobulins, and were thus of no value for differential diagnosis. Whereas both IgG and IgA are elevated in alcoholic cirrhosis, the elevation being proportional to the severity of the disease, active chronic "lupoid" hepatitis is characterized by a selective increase in IgG, and obstructive jaundice is accompanied by increased IgG levels only if complicated by intrahepatic cholangitis. The quantitative determination of IgG and IgA levels is recommended as an aid in the differential diagnosis of chronic inflammatory liver disease.

4444 PERSONAL RESULTS WITH ANTIMETABOLITES IN THE IMMUNOSUPPRESSIVE THERAPY OF CHRONIC LIVER DISEASE. *(Fr.)*

Demeulenaere, L. (Med. Clin., U. Ghent, Belgium), J. van Egmond, R. Lacres and R. Rottiers. *Acta Gastroent Belg* 31(6):424-434, 1968.

6-Mercaptopurine (100 mg/day for 3 months, then 50 mg/day for 3 months and finally 50 mg every 2 days or twice weekly until normalization of the laboratory tests, in some for over 3 yr) was used in the treatment of 30 patients (10 men and 20 women, 15-60 yr old, average 31.2 yr) with active chronic hepatitis of from a few months (9 cases) to one or several years (21 cases) duration; 16 of these patients were still under treatment at time of publication, while 14 (including 5 treated 1-8 months after onset of symptoms and 9 with an 18-48 months' history) had completed treatment periods of 8-18 and 18-30 months, resp., and had been followed for at least 6 months thereafter (at least 18 months in 7 of 14). The hepatitis was probably viral in origin in at least 19 cases, and all 21 in whom the hepatitis had been present for more than one year had previously received corticosteroids. All 30 patients showed general weakness and hypergammaglobulinemia, 19 had arthralgia, 13 had cutaneous signs, 23 had a 3+ IgG on agar-gel electrophoresis, 21 had a positive LE test (LE cells and/or the AN factor), and the Coombs test was positive in 13 of 27 cases tested. The symptoms of hepatitis disappeared in all 14 cases in which treatment was completed, and all the biochemical, immunological and serological tests returned to normal. Among the other 16 patients, however, 5 who were under treatment for more than 2 yr still showed severely abnormal laboratory tests despite clinical improvement. Treatment was well tolerated, the only serious side effects being one case of gastrointestinal intolerance and one of bone-marrow depression (not included in the 30). The criteria for the selection of patients with active chronic hepatitis of the "lupoid" type, who are suitable for antimetabolite therapy, are discussed, and it is suggested that immunosuppressive therapy be used only in chronic cases showing signs of autoimmunization, purely IgG hypergammaglobulinemia, and lymphoplasmocytic infiltration without fibrosis.

4445 THE EFFECT OF BILE ACIDS AND RENAL ISCHEMIA ON RENAL FUNCTION. *(E.)*

Aoyagi, T. (Boston City Hosp., Mass.) and L. M. Lowenstein. *J Lab Clin Med* 71(4):686-692, 1968.

When male Sprague-Dawley rats (400-500 g) were given infusions of sodium cholate or sodium taurocholate (5 micromoles/min for 30 min) followed by 30 min of renal ischemia produced by clamping of the renal pedicle, all developed transient renal insufficiency lasting 4 days and characterized by a decrease in creatinine clearance and sodium excretion and an increase in serum creatinine. This effect was not prevented by i.p. injections of 10% mannitol (5 ml/day). Renal histology remained normal, however, in all but one case (calcification of the renal tubules). No renal insufficiency was produced by either either ischemia or infusion of bile salts alone, nor by renal ischemia preceded by infusions of bilirubin, albumin or saline, or sodium cholate followed by clamping of the ureter. These findings may help to explain the development of renal insufficiency in obstructive jaundice and cirrhosis.

4446 SERUM ENZYME LEVELS AS A MEASURE OF LIVER REACTION AFTER HYPOVOLAEMIC SHOCK AND OPERATION IN MAN. *(E.)*

Brohult, J. (Danderyds Hosp., Sweden) and J. Gillquist. *Acta Chir Scand* 134:353-362, 1968.

Comparative studies of the serum concentrations of ornithine carbamoyl transferase (OCT), glutamic-oxaloacetic transaminase (GOT) and glutamic-pyruvic transaminase (GPT) were carried out in 11 patients coming to operation with circulatory collapse and in 14 patients coming to operation without complications. In the shock group, the OCT values were significantly elevated over the controls in both the initial serum sample and 24 hr postoperatively. By 48 hr after operation, the serum OCT values in the shock group had fallen significantly. Both grou showed elevations of serum OCT levels 4-7 days after surgery. The mean initial serum GOT and GPT values for the shock group were also significantly higher than those of the control group, and the 24-hr serum GPT value in the shock group wa also significantly higher than that of the control group. No significant differences were found between the 2 groups on days 2, 4, 7, 8, or 11. The mean initial lactate value in the shock group was also higher than in the control group. The initial elevation of the serum enzyme levels in the shock grou is probably due to hypoxia of the liver cells, while the elevations seen later in both groups are probably due to metabolic factors.

4447 THE RENAL CLEARANCE OF AMINO ACIDS IN A PATIENT WITH WILSON'S DISEASE DURING PENICILLAMINE TREATMENT. *(E.)*

Bell, G. E. (Columbus State Hosp., Ohio), D. C. Slivka and J. R. Huston. *J Lab Clin Med* 71(1):113-121, 1968.

The effect of penicillamine on the aminoaciduria and urinary copper excretion of a patient with Wilson's disease was studie over a 17-month period by determining the renal clearances of 16 amino acids and by measuring the urinary excretion of copper. A control subject received penicillamine for 1 month Amino acid analyses were performed by resin column chromatography. Copper was determined by emission spectroscopy and bathocuproine complexing. After penicillamine treatmen had been started, the patient had reduced renal clearances of the amino acids which had been excreted in large quantities prior to treatment. Blood levels of amino acids did not increase as the renal clearances decreased. In the control subjec no change was seen in this group of amino acids during penicillamine administration. Clearance rates of the amino acids did not correlate with urinary copper excretion. Increased renal clearance of sulfur-containing amino acids occurred during penicillamine treatment in both the patient and the contro subject, correlating with the period of augmented cupriuresis. Decreased aminoaciduria was not accompanied by improveme in the patient's neurological status, and it preceded by 1 yr any reduction in the Kayser-Fleischer rings. It is suggested that penicillamine's action in decreasing aminoaciduria is not due to a direct effect on the kidney.

4448 ORTHOTOPIC LIVER ALLOTRANSPLANTATION USING AN INTERNAL VASCULAR SHUNT. *(E.)*

Fonkalsrud, E. W. (Sch. Med., Los Angeles, Calif.), G. H. Stevens, W. L. Joseph, D. Rangel, Y. Yakeishi and W. P. Longmire Jr. *Surg Gynec Obstet* 127(5):1051-1057 1968.

Internal vascular shunting during orthotopic hepatic allografting, providing extensive flow from the portal vein and inferior vena cava to the right atrium without construction of a portacaval anastomosis, was successfully performed in 10 dogs and a 30-month-old infant with biliary atresia. Silastic tubing attached to a Y-connector with a 3-way stopcock was inserted into the right atrium. The distal limbs of the Y-tubing were then passed into the distal segments of the severed portal vein and inferior vena cava, resp. The liver was then removed after ligation of the suprahepatic portion of the inferior vena cava. The donor liver was then transplanted to the recipient with appropriate vascular suturing. Heparin was not employed during the shunting. The technique is technically easy and rapid, obviating the construction of a portacaval anastomosis.

4449 EXTRAHEPATIC OBSTRUCTION OF THE PORTAL VENOUS SYSTEM.

(E.) Maddrey, W. C. (Johns Hopkins U. Ctr. Med. Res., Calcutta, India), K. C. B. Mallik, F. L. Iber and A. K. Basu. *Surg Gynec Obstet* 127(5):989-998, 1968.

The clinical features and results of treatment in 37 patients with extrahepatic obstruction of the portal venous system are presented. The average age at onset of symptoms was 16 yr and 89% were less than 30 yr old when referred for surgical treatment. In the majority of patients, the etiology was obscure. Five patients had a history of neonatal umbilical sepsis, 1 had abdominal trauma, and 2 had pancreatitis. The wedged hepatic venous pressure was normal and the intrasplenic pressure was markedly elevated. Liver blood flow was below normal. Plasma volume was markedly elevated, but liver function tests were usually normal. Liver biopsy consistently revealed an increased reticular condensation about the portal triads, possibly secondary to an altered hepatic circulation. Splenorenal or mesenteric-caval anastomosis were associated with good results in patients 10 yr of age or older. Splenectomy alone usually produced poor results.

4450 BILE STASIS AFTER HEPATIC RESECTION.

(E.) Dow, R. (U. Michigan Med. Ctr., Ann Arbor) and N. Thompson. *Surg Gynec Obstet* 127(5):1075-1078, 1968.

The technique used in the successful management of 4 patients having major hepatic resections is presented. Two of the patients had traumatic avulsions of the right hepatic veins, 1 had a primary hepatoma, and 1 had traumatic lacerations of the liver. After hepatic resection, biliary decompression was induced by either a T-tube in the common bile duct or a small catheter in the amputated hepatic duct. Saline or methylene blue was hand-injected into the bile duct through the catheter while the cut hepatic surface was carefully observed for potential postoperative bile leaks. The leaks were identified by extravasation of the injected solution, and were carefully sealed by individual nonabsorbable sutures. No massive ligatures compressing the hepatic parenchyma were used, and no attempt was made to cover the raw surface of the liver after resection. Abdominal drains were completely devoid of bile postoperatively. The only complication encountered was probable intraperitoneal bile accumulation which developed in 1 patient immediately after removal of the T-tube on the 14th postoperative day. The common bile duct tubes should remain in place for at least 3 weeks.

4451 TISSUE ACID HYDROLASE ACTIVITIES IN GAUCHER'S DISEASE.

(E.) Ockerman, P. A. (U. Hosp., Lund, Sweden) and P. Kohlin. *Scand J Clin Lab Invest* 22(1):62-64, 1968.

The activity of the lysosomes in Gaucher's disease was studied by measuring 7 acid hydrolases known to be, at least largely, localized to the lysosomes. Measurements were made in autopsy specimens from liver, spleen, and brain and in liver biopsy specimens from patients with Gaucher's disease. The β-glucosidase activity was significantly decreased in all tissues analyzed. Acid phosphatase had a very high activity in spleen, but normal or only slightly increased levels were seen in liver and brain. β-Acetylglucosaminidase had an increased activity in liver and spleen, but not in brain. β-Glucuronidase had increased activity in spleen, but not in liver or brain. β-Galactosidase and α-mannosidase had similar activities in all tissues compared to that of controls, while the α-fucosidase activity was increased in all tissues.

4452 PREVENTION OF THE ETHANOL-INDUCED FATTY LIVER BY CHLORCYCLIZINE-INDUCED MAINTENANCE OF HEPATIC LIPID OXIDATION.

(E.) Wooles, W. R. (Med. Coll. Va., Richmond) and R. J. Weymouth. *Lab Invest* 18(6):709-714, 1968.

The time sequence of the development of acute ethanol-induced fatty liver and the protective effect of chlorcyclizine (25 mg/kg/day i.p. for 3 days) were studied in female albino Holtzmann rats. Ethanol (3 g/kg) was given by oral intubation 2 hr after administration of chlorcyclizine or saline control solution (control rats received an equivalent volume of isocaloric glucose). At 8 hr after ethanol administration all rats were given 10 μC palmitic acid-1-^{14}C i.v. Maximal fatty liver was observed 8 hr after intubation as indicated by a 117% increase in liver triglyceride levels above the values observed in the control group. At 16 hr the triglyceride level was 87% above the control group while rats pretreated with chlorcyclizine and receiving the same dose of ethanol showed no biochemical or histological evidence of fatty degeneration induced by ethanol. Plasma free fatty acid levels were not increased above control levels by ethanol at any time, nor did chlorcyclizine pretreatment affect the free fatty acid response produced by ethanol. Oxidation of the labeled palmitic acid was depressed in ethanol-treated rats for 8 hr after administration, while chlorcyclizine-treated rats had a $^{14}CO_2$ output similar to that of the control group for each time period. The data indicate that, in part, chlorcyclizine protects against ethanol-induced fatty liver by maintaining the hepatic oxidation of fatty acids at a normal rate.

4453 FLUID AND ELECTROLYTE BALANCE DURING ACUTE WITHDRAWAL IN CHRONIC ALCOHOLIC PATIENTS.

(E.) Beard, J. D. (Tennessee Psychiatric Hosp. Inst., Memphis) and D. H. Knott. *JAMA* 204(2):135-139, 1968.

Total body water, extracellular fluid and plasma volume, and plasma and erythrocyte electrolyte concentration and excretion were measured in 30 well-nourished, carefully selected, chronic-alcoholic men during acute withdrawal. The average value for total body water was 565 ml/kg (antipyrine space) upon admission and 516 ml/kg 4 days later. Plasma and erythrocyte concentrations were within normal limits upon admission and after 4 days. There was a significant increase in urinary Na^+, Cl^+ and K^+ and milliosmol excretion during the first 4 days. Total urinary output increased in the 4-day period but there was no attempt made to determine insensible and fecal water loss. Average admission values for SGOT, serum isocitric dehydrogenase and sulfobromophthalein were above normal but decreased after 4 days; average SGPT and bilirubin values were normal. The results indicated that overhydration predominated and solute retention or endogenous mobilization of solute or both must have occurred since the increase in total body water was isosmotic in nature. Total body water decreased to normal in 4 days without specific fluid or electrolyte therapy. It is suggested that the common presumption of all alcoholics being dehydrated and consequently treated with i.v. fluids be reviewed as a result of this present data. Overhydration appears to be more common than formerly suspected; the efficacy of diuretics in treating many of these patients should be further investigated.

4454 **DIFFERENTIAL PORTAL PRESSURES IN RELATION TO PROGNOSIS AND TO SURVIVAL OF PATIENTS UNDERGOING PORTACAVAL SHUNT.** *(E.)* Taylor, P. C. (Cleveland Clinic, Ohio), N. R. Hertzer and R. E. Hermann. *Cleveland Clin Quart* 35(4):183-191, 1968.

A study of differential portal pressures (preshunt free portal pressure, hepatic and splanchnic pressures on either side of the occluded portal vein, postshunt portal pressure) was made at operation in 77 patients (39 men and 38 women, average age 48 yr) who underwent portacaval shunts (65 end-to-side, 12 side-to-side) in order to relate the findings to prognosis and survival. There was no distinct trend in the measurement of pre- and postshunt pressures in 75 patients. Extremes of pressure and pressure drops were comparable in patients with good or with poor postoperative results. Of 69 patients classified preoperatively as having good liver function, 45 survived and did well and 24 had poor long-term results. Comparison of the mean pressures of these 69 patients showed no apparent difference. The 8 patients with poor liver function showed no difference in mean pressure values even though 4 had good operative results while 4 did not. The results indicate that liver function is the most important factor in the selection of patients for portacaval shunts while the pattern of portal pressures measured at the time of operation is not useful in predicting the results of shunt procedures.

4455 **PRIMARY CARCINOMA OF THE LIVER IN EAST PAKISTAN.** *(E.)* Islam, N. (Inst. Post-Grad. Med., Dacca, East Pakistan), H. Mahtab and A. K. A. Khan. *J Trop Med Hyg* 71(8):206-211, 1968.

Detailed histories are presented for 5 cases of primary hepatic carcinoma. Three of these cases (2 men and 1 woman) had high erythrocyte sedimentation rates and an elevated serum alkaline phosphatase. A fourth case (female) presented with vomiting and loss of appetite in addition to the previous symptoms and secondary hepatic carcinoma with a primary malignancy in the stomach, was suspected; at laparotomy, hepatocellular carcinoma was correctly diagnosed. The fifth case (male, 50) had cirrhosis (due to alcoholism and viral hepatitis), hemorrhagic ascites and an irregular hard liver, all of which favored primary hepatic carcinoma. Cirrhosis, nutritional deficiencies, hemochromatosis, syphilis and hepatotoxic drugs are all thought to be involved in the etiology of primary hepatic carcinoma. Raised alkaline phosphatase, moderate to marked leukocytosis and slightly raised transaminase activity are suggestive of primary hepatic carcinoma.

4456 **HYPERKALEMIA ACCOMPANYING CANINE PORTAL VENOUS OCCLUSION.** *(E.)* Bergan, J. (Northwestern U. Med. Sch., Chicago, Ill.), E. Teixeira, H. Yu, W. Clarke and M. Coburn. *Surgery* 64(3):629-633, 1968.

The role of splanchnic venous occlusion in acute portal and systemic hyperkalemia and the resultant hypotension, bradycardia, and cardiac arrest were studied in 15 of 30 mongrel dogs (7-20 kg) surviving 30-, 60-, and 90-min periods of venou obstruction and the 60-min period after revascularization. Respiration was controlled mechanically and arterial blood pressure and electrocardiograms were monitored throughout the experiment. Blood samples taken at 10- and 20-min intervals throughout the procedure were analyzed for Na, Cl, K, urea nitrogen, glucose, LDH, and SGOT; the animals were sacrificed after the experiment and microscopic examinations of small intestine, pancreas, liver, and spleen specimens were made. Portal and caval hyperkalemia increased progressively during the period of occlusion; electrocardiographic findings were suggestive of hyperkalemia-induced myocardial toxicity. Extreme congestion of the gastrointestinal tract was observed immediately after occlusion; at death, microscopic examination revealed extreme bowel mucosa congestion and sloughing. Blood pressure dropped sharply upon obstruction. Portal blood K levels averaged 7.1, 8.5, and 11.5 mEq/liter after 30-, 60-, and 90-min occlusions, resp.; systemic values averaged 8.3, 6.8, and 10.0 mEq/liter for the same time periods. Hyperkalemia appears to be the primary cause of lethality after porta vein occlusion in dogs.

4457 **QUANTITATIVE STUDY OF COLLOIDAL PHAGOCYTOSIS OF THE RETICULOENDOTHELIAL SYSTEM IN BILHARZIAL HEPATOSPLENOMEGALY USING ^{198}Au.** *(E.)* El-Saadani, A. M. (Fac. Med., Cairo U., Egypt, UAR), M. Moustafa, M. T. El Gengehy and M. A. Fayez. *J Trop Med Hyg* 71(8):193-197, 1968.

The phagocytic capacity of the reticuloendothelial system in the liver, spleen, and bone marrow was studied in 10 normal controls and 40 patients with bilharzial hepatosplenomegaly using colloidal ^{198}Au. The bilharzial cases were subdivided into 4 groups: group I patients had hepatomegaly with minimal splenic enlargement; group II patients had marked splenomegaly with no gross hepatomegaly; group III patients had ascites; and group IV patients had advanced hepatocellular failure and precoma. In the control cases, liver uptake was 91%, spleen was 6%, and bone marrow was 0.5%. In group I, there was a significant rise in isotope uptake by the liver, splenic uptake did not differ compared to normal values, and bone marrow uptake was significantly increased. In group II, liver uptake decreased significantly, splenic uptake showed a significant rise, and bone marrow uptake was even greater than in group I. In group III, hepatic uptake showed further diminution, bone marrow uptake continued to rise, and splenic uptake showed no significant change from group II. Group IV exhibited a significant diminution in all 3 compartments.

4458 **RED CELL LIPIDS IN ZIEVE'S SYNDROME: THEIR RELATION TO HEMOLYSIS AND TO RED CELL OSMOTIC FRAGILITY.** *(E.)* Westerman, M. P. (U. Pittsburgh Sch. Med., Pa.), S. P. Balcerzak and E. W. Heinle Jr. *J Lab Clin Med* 72(4):663-669, 1968.

In 6 patients with Zieve's syndrome, studies of red-cell lipid concentrations, hyperlipemia, hemolysis, and red-cell osmotic fragility were made during both exacerbations and remissions of the syndrome's symptomatology. In the acute stages of the syndrome, red-cell lipid levels showed increases in the total lipid, cholesterol, and phospholipid fractions. Increased lecithin evels were mainly responsible for the increased phospholipid fraction. Red-cell lipid increases were also observed during periods of hyperlipemia and hemolysis although the patients were not in a typical Zieve state. Remissions were associated with normal or less extensive increases in red-cell lipid levels. ncreases in red-cell lipid levels were associated with decreases n red-cell fragility, the predominant abnormality being an increase in resistance to osmotic lysis.

4459 **ORTHOTOPIC HOMOTRANSPLANTATION OF THE HUMAN LIVER.** *(E.)* Starzl, T. E. (U. Colorado Sch. Med., Denver), C. G. Groth, L. Brettschneider, I. Penn, V. A. Fulginiti, J. B. Moon, H. Blanchard, A. J. Martin Jr. and K. A. Porter. *Ann Surg* 168(3):392-415, 1968.

Seven patients (6 girls and 1 boy, aged 13 months to 16 yr) were treated by orthotopic homotransplantation of cadaver livers for congenital extrahepatic biliary atresia (5 cases) or hepatic carcinoma (2 cases). The histocompatibility match between donors and recipients ranged from poor to excellent. The homografts received interim preservation by hypothermia, hyperbaric oxygenation, and perfusion with diluted blood, after donor death. Postoperative immunosuppressive therapy was provided with azothioprine, prednisone, and heterologous antilymphocyte globulin. Four recipients died after 60-186 days, but 3 remain alive after 4-12 months. In the 5 livers studied microscopically from 60 days to 6 months after transplantation, portal fibrosis, small lymphocyte infiltration around the portal vein branches, proliferation of small bile ductules, and central cholestasis were found. In the longer surviving homografts many small hepatic artery branches were narrowed by intimal thickening. These changes, thought to represent rejection, were least severe in the homograft most compatible with the recipient as shown by lymphocyte typing.

4460 **IMMEDIATE AND LONG-TERM EFFECTS OF ACUTE HEPATIC ISCHEMIA. II. VASCULAR LESIONS IN EXPERIMENTAL LIVER ISCHEMIA.** *(E.)* Grana, L. (Northwestern U. Sch. Med., Chicago, Ill.), M. Saldana, W. L. Donnellan and O. Swenson. *Arch Surg* 97(3): 500-513, 1968.

The pathological changes which occur in the small blood vessels of the liver during and after ischemia were studied in 13 dogs. In each dog, a portacaval shunt was established and the hepatic artery was temporarily occluded (30 min to 4 hr) during the period of bypass. Biopsies of the liver were taken before and after the period of ischemia, with subsequent biopsies performed during the follow-up period. It was found that liver ischemia of up to 4 hr duration is compatible with survival provided that a portacaval shunt is established to prevent splanchnic congestion and shock. The definite histological changes in the venous channels become progressively more severe with increasing periods of hepatic-inflow interruption. The major acute changes are Kupffer cell enlargement and disintegration, dilatation of the spaces of Disse and hepatic lymphatics, and damage to the central and sublobular veins. Permanent changes in the outflow vessels and sinusoids associated with reduction in the size of the liver and chronic changes in the parenchymal cells are constantly observed after 2 hr of ischemia. The portal triad is relatively unaffected following ischemia of 2 to 4 hr duration. The localization of the lesions to the sinusoids and the hepatic outflow system suggests that toxic products are generated by the ischemic liver and act on the hepatic drainage pathways following release of the portal occlusion.

4461 **TECHNIQUE FOR PARTIAL HEPATECTOMY IN THE DOG.** *(E.)* Grafton, T. S. (U. S. Army Natick Lab., Mass.) and M. A. Kilmore. *Lab Anim Care* 18(4):436-441, 1968.

4462 **INTRAHEPATIC CHOLESTASIS DUE TO SUBCAPSULAR HEMATOMA OF THE LIVER.** *(Por.)* Mirtirani, A. ("Darcy Vargas" Nursery Hosp., Sao Paulo, Brazil), T. de Brito, L. A. da Silva and M. H. Akyio Watanabe. *Matern Infanc (S Paulo)* 26(4):371-374, 1967.

4463 **INTRAHEPATIC CHOLESTASIS IN THE NEWBORN.** *(E.)* Haas, L. (City Hosp., Exeter, Devon, England). *Arch Dis Childh* 43(230):438-443, 1968.

4464 **PRIMARY CARCINOMA OF THE LIVER.** *(E.)* Kshirsagar, V. H. (Dept. Path., Grant Med. Coll., Bombay, India), S. H. Mansukhani and R. K. Gadgil. *Indian J Path Bact* 11(2):112-120, 1968.

4465 **EXPERIMENTAL MEASUREMENTS OF HEPATIC BLOOD FLOW DURING CHOLESTASIS.** *(E.)* Kubiak, J. (Radiobiol. Med. Acad., Warsaw, Poland), J. Platowski, W. Liszka, K. Bielecki, M. Simoni, H. Olechnowicz, Z. Lewicki and S. Lipinski. *Pol Med Sci Hist* 11(3):115-119, 1968.

4466 **SEGMENTAL SURGICAL DISEASE OF THE LIVER.** *(E.)* Braasch, J. W. (Lahey Clinic Found., Boston, Mass.). *Ann Surg* 168(1):110-115, 1968.

4467 **PORTAL VEIN GRAFTS: MICROSCOPIC STUDY AFTER A SEVEN YEAR FOLLOW-UP.** *(E.)* Wimberly, J. E. (Vanderbilt U. Sch. Med., Nashville, Tenn.), P. N. Symbas and J. H. Foster. *Surgery* 64(4):761-762, 1968.

4468 **PORTARENAL SHUNT.** *(E.)* Guarnaccia, V. T. (Detroit, Mich.). *Harper Hosp Bull* 26(3):134-139, 1968.

4469 **CARCINOMA, THYMIDINE UPTAKE, AND MITOSIS IN THE LIVERS OF RATS EXPOSED TO AFLATOXIN.** *(E.)* Newberne, P. M. (Mass. Inst. Technol., Cambridge, Mass.) and A. E. Rogers. *New Zeal Med J* 67(426): 8-17, 1968.

4470 **TUBERCULAR ABSCESS OF THE LIVER.** *(Por.)* da Cunha, M. de A. R. (Med. Clin., Fed.,U. Rio de Janeiro, Brazil), O. F. de Gouveia, D. Teixeira and E. Galper. *Hospital* 73(6):131-139, 1968.

4471 **CHRONIC CHOLANGITIDES: AETIOLOGY, DIAGNOSIS, AND TREATMENT.** *(E.)* Sherlock, S. (Royal Free Hosp., London, England). *Brit Med J* 3(5617): 515-521, 1968.

4472 **LATE EFFECTS OF BILIARY STASIS ON THE EFFECTIVE LIVER BLOOD FLOW.** *(E.)* Aronsen, K. F. (Gen. Hosp., Malmö, Sweden). *Acta Chir Scand* 134(3-4):278-281, 1968.

4473 **HEPATIC MICROANATOMY IN HYPERVITAMINOSIS A IN MAN AND RAT.** *(E.)* Lane, B. P. (New York U. Sch. Med., New York City). *Amer J Path* 53(4):591-594, 1968.

4474 **THE SIGNIFICANCE OF MITOCHONDRIAL ANTIBODIES IN LIVER DISEASE.** *(E.)* Doniach, D. (Middlesex Hosp., London, England), G. J. Walker and I. M. Roitt. *Acta Gastroent Belg* 31(6):399-406, 1968.

4475 **HAEMOPERITONEUM FROM SPONTANEOUS RUPTURE OF PRIMARY HEPATIC CARCINOMA.** *(E.)* McArthur, J. (Victoria Infirmary, Glasgow, Scotland) and R. A. L. Low. *Brit J Clin Pract* 22(7):302-305, 1968.

4476 **BENIGN TUMORS AND PSEUDO-TUMORS OF THE LIVER.** *(Fr.)* Betz, E. H. (Lab. Path. Anat., U. Liege, Belgium) and E. Balthazar. *Actualites Hepatogastroent Hotel Dieu* 3(4):331-347, 1967.

4477 **A NEW TECHNIQUE FOR LIVER TRANSPLANTATION.** *(It.)* Mercati, U. (Inst. Spec. Surg. Path., U. Perugia, Italy), D. Morettini, F. Pasquini, F. Berardi, A. Gerardi and G. Castrini. *Chir Ital* 19(1):1-34, 1967.

4478 **CHANGES IN BLOOD PROTEINS DUE TO CHRONIC LIVER DISEASES.** *(Hun.)* Jako, J. and G. Sas. *Orv Hetil* 109(28):1523-1526, 1968.

4479 **AUTOIMMUNITY IN LIVER DISEASE: A SEROLOGICAL INVESTIGATION BASED ON COMPLEMENT SHIFTS, PASSIVE HEMAGGLUTINATION AND PRECIPITATION.** *(Fr.)* Eyquem, A. (Pasteur Inst., Paris, France) and L. Gurow. *Acta Gastroent Belg* 31(6):379-398, 1968.

4480 **STUDY OF IMMUNOLOGICALLY COMPETENT CELLS IN "AUTOIMMUNE" LIVER DISEASES.** *(Fr.)* Fiasse, R. (St. Pierre U. Clin., Louvain, Belgium). *Acta Gastroent Belg* 31(6):407-415, 1968.

4481 **ORIGIN AND LOCALIZATION OF AN INTRAHEPATIC BLOCK DURING ISOLATED HETEROLOGOUS LIVER PERFUSION.** *(Ger.)* Paquet, K. J. (Path. Inst., Bonn U., Germany), J. Cerny, W. Wessel, P. Eckert and J. Bensch. *Bruns' Beitr Klin Chir* 216(5):453-459, 1968.

4482 **AUTOIMMUNITY IN HEPATIC DISEASES: SEROLOGICAL STUDIES USING THE COMPLEMENT-FIXATION, PASSIVE HEMAGGLUTINATION, AND PRECIPITATION TESTS.** *(Rev.)(Fr.)* Eyquem, A. (Pasteur Inst., Paris, France) and L. Gurow. *Acta Gastroent Belg* 31(6):379-398, 1968.

4483 **STUDY OF THE IMMUNOCOMPETENT CELLS IN THE "AUTOIMMUNE" DISEASES OF THE LIVER.** *(Rev.)(Fr.)* Fiasse, R. (St. Pierre Clin., U. Louvain, Belgium). *Acta Gastroent Belg* 31(6):407-415, 1968.

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4485 **METASTATIC CARCINOMA OF THE LIVER: ANALYSIS OF 100 CASES.** *(Sp.)* Salomon, R. (Dept. Gastroent., Cent. U. Venezuela, Caracas), J. Lecuna T., J. Valencia-Parparcen, M. Durand and A. M. Saldivia. *GEN* 22(3):197-206, 1968.

4486 **DISEASE OF THE DIGESTIVE SYSTEM: DRUGS AND THE LIVER.** *(E.)* Sherlock, S. (Royal Free Hosp., London, England). *Brit Med J* 1(5599):227-229, 1968.

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4488 **SCLEROSING CHOLANGITIS: REVIEW AND PRESENTATION OF AN UNUSUAL PATHOLOGIC VARIANT.** *(E.)* Grua, O. E. (David O. McKay Hosp., Ogden, Utah) and J. A. McMurrin. *Amer J Surg* 116(5):659-663, 1968.

4489 **TRIALS WITH DRUG PROPHYLAXIS IN SCHISTOSOMAL INFECTION IN EXPERIMENTAL ANIMALS.** *(E.)* Mousa, A. H. (Endemic Med. Dept. Cairo U., Egypt), A. El Garem, E. El Rasiky and A. Abdel Latif *J Trop Med Hyg* 71(8):198-205, 1968.

4490 **THE "H GRAFT" IN PORTACAVAL SHUNTS.** *(E.)* Nabseth, D. C. (Tufts U. Sch. Med., Boston, Mass.), E. T. O'Hara, L. J. Marks and I. O. Mehrez. *Ann Surg* 168(2):201-206, 1968.

4491 **AMMONIA AND LIVER DISEASE.** *(E.)* Broe, G. A. (Lidcombe Hosp., Sydney, Australia). *Postgrad Bull* 24(3):57-65, 1968.

4492 **HEREDITARY HEPATOLENTICULAR DEGENERATION (WILSON'S DISEASE). REPORT OF THE FIRST CASE IN JAMAICA.** *(E.)* Miller, G. J. and V. Persaud. *Trop Geograph Med* 20(3):225-232, 1968.

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4494 **TREATMENT OF DIABETIC FATTY LIVER WITH BUFORMIN.** *(Ger.)* Möller, E. (Munic. Hosp., Kassel, Germany). *Med Klin* 62(48):1873-1876, 1967.

495 TYROSINE METABOLISM IN PATIENTS WITH LIVER DISEASE. *(E.)* Levine, R. J. ale U. Sch. Med., New Haven, Conn.) and H. O. Conn. *J lin Invest* 46(12):2012-2020, 1967.

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4498 THE HEPATIC CIRCULATION IN TRAUMATIC SHOCK. *(Rus.)* Seleznev, S. A., A. M. Granov and N. V. Sinitsyn. *Biull Eksp Biol Med* 33(9):14-17, 1968.

4499 IDIOPATHIC UNCONJUGATED HYPERBILIRUBINEMIA (GILBERT'S SYNDROME): A STUDY OF 42 FAMILIES. *(E.)* Powell, L. W. (Royal Free Hosp., London, England), E. Hemingway, B. H. Billing and S. Sherlock. *New Eng J Med* 277(21):1108-1112, 1967.

4500 LIVER TRANSPLANTATION. *(E.)* Calne, R. Y. *Gut* 9(3):262-265, 1968.

4501 PROGNOSTIC AND THERAPEUTIC CRITERIA IN NEONATAL JAUNDICE WITH AND WITHOUT ISOIMMUNIZATION: REPORT OF PERSONAL CASES. *(It.)* Gandolfo Caramello, M. T. (Maria Vittoria Hosp., Turin, Italy) and G. Martinetto. *Minerva Pediat* 20(32):1606-1615, 1968.

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4503 HYDATID DISEASE OF THE LIVER ASSUMING THE CLINICAL FEATURES OF OTHER DISEASES OF THE LIVER AND BILIARY TREE. *(E.)* Papazoglou, O. (2nd Surg. Clin., U. Thessalonika, Greece), E. Giakustidis and S. Karamanolis. *Bull Soc Int Chir* 27(3):214-222, 1968.

4504 STUDIES ON FIBRINOLYSIS IN PATIENTS WITH BANTI'S SYNDROME. *(E.)* Takahama, T. (Kumamoto U. Med. Sch., Japan). *Kumamoto Med J* 21(2):49-66, 1968.

4505 LIVER AND BLADDER CARCINOMAS IN GUINEA PIGS GIVEN DI(n-BUTYL)NITROSAMINE. *(Ger.)* Ivankovic, S. (Max Planck Inst. Immunobiol., Freiburg i. Br., Germany) and J. Bucheler. *Z Krebsforsch* 71(2):183-185, 1968.

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4508 AN OBSERVATION ON THE DEVELOPMENT OF FATTY LIVER—THE EFFECTS OF VARIOUS NUCLEOTIDES ON THE FATTY LIVER INDUCED BY OROTIC ACID. *(E.)* Okabe, K. (Jikei U. Sch. Med., Japan). *Jikei Med J* 13(1):29-30, 1966.

4509 ABNORMALITIES OF AMMONIA METABOLISM. *(Rev.)(E.)* Brown, H. (Harvard Med. Sch., Boston, Mass.), P. Michelson and W. V. McDermott Jr. *Postgrad Med* 44(2):135-139, 1968.

4510 ACTIVATION OF CARCINOGENIC AROMATIC AMINES AND AMIDES BY N-HYDROXYLATION *IN VIVO*. *(E.)* Miller, J. A. (Med. Ctr., U. Wisconsin, Madison) and E. C. Miller. Carcinogenesis: A Broad Critique [Collection of Papers Presented at the Twentieth Annual Symposium on Fundamental Cancer Research, 1966], Baltimore, Williams & Wilkins, 1967, pp. 397-420.

4511 IMMUNOLOGICAL ASPECTS OF ACTIVE CHRONIC HEPATITIS AND PRIMARY BILIARY CIRRHOSIS. *(E.)* Sherlock, S. (Royal Free Hosp., London, England). *Acta Gastroent Belg* 31(6):416-423, 1968.

4512 THE SIGNIFICANCE OF MITOCHONDRIAL ANTIBODIES IN LIVER DISEASE. *(E.)* Doniach, D. (Middlesex Hosp. Med. Sch., London, England), G. J. Walker and I. M. Roitt. *Acta Gastroent Belg* 31(6):399-406, 1968.

4513 FATTY DEGENERATION OF THE LIVER AFTER INTESTINAL BYPASS FOR OBESITY. [REPORT OF TWO CASES] *(E.)* Maxwell, J. G. (U. Utah Coll. Med., Salt Lake City), R. C. Richards and D. Albo Jr. *Amer J Surg* 116(5):648-652, 1968.

4514 ENDOCRINE FACTORS AS DETERMINANTS OF THE SUSCEPTIBILITY OF THE LIVER TO CARCINOGENIC AGENTS. *(E.)* Goodall, C. M. (Dept. Tumor Biol., U. Otago, Dunedin, N. Zealand). *New Zeal Med J* 67(426):32-41, 1968.

4515 THE DIET AND LIVER DISEASE. *(It.)* Pirami, E. (Bologna, Italy) and L. Alvisi. *Minerva Med* 59(48):2763-2771, 1968.

See also abstract nos.: 3822,3883,3894,3901,3902,3924

4516 MITOCHONDRIAL AND FATTY CHANGES IN HEPATOCYTES OF PATIENTS WITH WILSON'S DISEASE. *(E.)* Sternlieb, I. (Albert Einstein Coll. Med., Bronx, New York City). *Gastroenterology* 55(3):354-367, 1968.

Among 28 patients with a definite diagnosis of Wilson's disease (based on family history, hypoceruloplasminemia and excessive hepatic copper concentrations) but with generally early and asymptomatic or well-controlled forms, 20 showed minimal-moderate changes but no significant new findings in liver biopsy specimens obtained by Menghini needle. The other 8 patients, however, including 5 (2.5-10 yr old) who were asymptomatic (4 of 5 untreated) and 3 (10-40 yr old) with symptoms (corneal Kayser-Fischer rings and hepatic or neurological manifestations; 2 untreated and 1 treated for 6 yr with penicillamine and a low-Cu diet), showed marked changes in the hepatocyte mitochondria. These changes included: increased electron density of the matrix; abnormal folding of the inner membrane with dilatation of the intercristal spaces; loose outer membranes; giant or bizarre shapes; electron-transparent vacuoles containing loosely-packed granular material; geometric, filamentous, rod-like or tightly coiled, paracrystalline inclusions; and round osmiophilic inclusions. The serum ceruloplasmin was 1-7 mg% in 6 of these 8 cases, 11-22 mg% in the other 2; the hepatic Cu concentration was 514-1644 μg/g; and liver function tests were abnormal in 5 of the 8 cases. Since 7 of 8 also showed fatty infiltration of the liver, it is suggested that this is related in some way to the mitochondrial alterations in the hepatocytes, even though there is no definite evidence that these mitochondrial changes are actually caused by copper. Similar mitochondrial changes were later observed in 3 of the 4 asymptomatic siblings of another patient with Wilson's disease, all 3 of whom also had elevated hepatic Cu concentrations and fatty infiltration.

4517 ANABOLIC STEROID THERAPY AS AN ADJUNCT TO DIET IN ALCOHOLIC HEPATIC STEATOSIS. *(E.)* Mendenhall, C. L. (Indiana U. Sch. Med., Indianapolis). *Amer J Dig Dis* 13(9):783-791, 1968.

In 9 chronic alcoholics (8 men and 1 woman, 33-54 yr old) with hepatomegaly and marked fatty infiltration of the liver (over 70%) as revealed by needle biopsy (with cirrhosis in 2 cases), but with no symptoms of hepatitis or cirrhosis and no clinical evidence of hepatic decompensation, vitamin deficiency, malnutrition, Zieve's syndrome, or other complicating illnesses, the time required for complete histologic normalization of the fatty liver (determined by repeated biopsies at 3-7 day intervals) averaged 59 days (range 38-77 days) in 4 controls treated by diet alone (3000 calories and 120 g protein daily, plus multivitamins) compared to only 13 days (range 11-16 days) in 5 patients also given an anabolic steroid (testosterone, 100 mg/day i.m., or norethandrolone, 40 mg/day p.o.). Hepatomegaly decreased after 48 hr on steroid therapy and the liver size was normal after 1 week. Bromsulfalein retention and serum glutamic-oxaloacetic transaminase activity decreased concomitantly with the histological disappearance of fatty infiltration and reached normal values when the liver biopsy showed grade 1-2 fatty infiltration (except in the 2 cases with cirrhosis where a bromsulfalein retention of 8-10% persisted). The only complication was transitory cholestatic jaundice due to norethandrolone in 1 patient. Subsequently, an additional patient with severe alcoholic fatty cirrhosis complicated by an acute episode of alcoholic hepatitis (deep jaundice, fever, ascites, hepatomegaly and marked mental confusion on admission) was also treated successfully by diet plus norethandrolone for 14 days, although the response to the steroid was not as marked as in the previou 5 patients.

4518 THE EFFECT OF VARIOUS NUCLEOTIDES ON EXPERIMENTAL FATTY LIVER AND HEPATIC DAMAGE. *(E.)* Takahashi, T. (Jikei U. Sch. Med., Minatoku, Tokyo, Japan) and K. Fujisawa. *Jikei Med J* 13(2):143-152, 1966.

Experiments on male albino rats and mice showed that orotic acid (1% in the diet or 50 mg/kg/day) tends to produce fatty infiltration and fibrosis and to increase the liver damage caused by CCl_4 or the fungus *Penicillium islandicum sopp.* Fed alone to rats, orotic acid produced a transitory decrease in triglycerides and increase in phospholipids in the liver, followed by a marked increase in hepatic triglycerides, decrease in phospholipids, and eventually an increase in the content of hexosamines and hydroxyproline. These changes were found to be due to a decrease in fatty acid oxidase activity accompanied by increases in fatty acid synthetase, glutamine hexose-6-phosphate transamidase, and the enzymes of the hexose monophosphate shunt (glucose-6-phosphate dehydrogenase, 6-phosphogluconate dehydrogenase, glucose-6-phosphatase and fructose-1,6-diphosphatase resulting in an increased production of TPNH and increased synthesis of triglycerides and hexosamine. The fatty infiltration and hepatic fibrosis produced in rats by feeding a diet containing 10% *Penicillium islandicum sopp,* which is characterized by decreases in hepatic glycogen and phospholipids, increased hydroxyproline and transitory increases in hexosamine and trigtriglycerides, was found to be stimulated by orotic acid and counteracted by 4-amino-5-imidazole carboxamide, inosine monophosphate or cytidine monophosphate; fibrosis was promoted, however, by uridine monophosphate. Similar results were obtained in mice fed diets containing 4-amino-5-imidazole carboxamide or inosine monophosphate and then given 0.05 ml of 20% CCl_4 in olive oil per 10 g of body weight by injection, resulting in a sharp decrease in liver glycogen and increase in serum transaminases.

4519 THE EFFECT OF WHOLE-BODY X-IRRADIATION OF GUINEA PIGS ON LIVER RIBOSOMES. *(E.)* Hidvégi, E. J. (Inst. Radiobiol., Budapest, Hungary), J. Holland, E. Bölöni, P. Lónai, F Antoni and V. Várterész. *Biochem J* 109(4):495-505, 1968.

The size distribution of liver ribosome aggregates and their protein-synthesizing ability *in vitro* were studied shortly after X-irradiation of guinea pigs. Sucrose-density-gradient analysis of the mitochondrial supernatant after treatment with deoxycholate revealed a gradual increase in the number of polysomes, reaching a maximum 9-15 hr after irradiation. At that time, the amount of ribonucleoprotein particles reached a level 25-30% above the control. The protein-synthesizing ability of total ribosomal particles measured *in vitro* showed an increase

amino acid incorporation parallel to the progressive enrich-
ent of polysomes. At radiation doses up to 1000 r the pro-
in-synthesizing capacity was dependent upon the radiation
se, reaching 40-60% above the control at the period of max-
al polysome enrichment. No further increase in amino acid
corporation occurred after radiation doses between 1000 r
d 3000 r. The enhanced protein-synthesizing activity was
e solely to the increase in the proportion of polysomes, since
adiation was without effect on the activity of single ribo-
mes.

520 **LIVER PARENCHYMAL CELL INJURY. VI.
SIGNIFICANCE OF EARLY GLUCOSE 6-
HOSPHATASE SUPPRESSION AND TRANSIENT CALCIUM
NFLUX FOLLOWING POISONING.** *(E.)* Reynolds, E. S.
Harvard Med. Sch., Boston, Mass.) and A. G. Yee. *Lab Invest*
9(3):273-281, 1968.

he early centrilobular suppression of glucose-6-phosphatase
ctivity and transitory influx of calcium into midzonal liver
arenchymal cells in rats following CCl_4 poisoning was also
ound to be a consequence of iodoform poisoning. Diiodo-
ethane and carbon tetraiodide affect glucose-6-phosphatase
ithin the 1st 8 hr after poisoning. Bromoform, carbon
etrabromide, and chloroalkanes other than CCl_4 do not ap-
reciably affect these parameters, whether or not centrilobular
ecrosis occurs. Halomethanes productive of similar early
ffects rank closely in order of reactivity in free radical re-
ctions. Water-soluble hepatotoxins do not affect glucose-6-
hosphatase or normal patterns of calcium staining until cen-
rilobular necrosis occurs. Hydrocarbons and chlorohydro-
arbons with solubility properties similar to those of CCl_4 do
ot reproduce the early lesion which follows CCl_4 poisoning,
lthough they may suppress glucose-6-phosphatase activity in
ormal microsomes *in vitro*. The early suppression of glucose-
-phosphatase activity and the transient midzonal influx of
alcium are not directly related to the development of subse-
uent liver cell necrosis, nor do they appear to be the result
f lipid solvent action *in vivo*.

521 **EFFECT OF CARBON TETRACHLORIDE
ON THE SYNTHESIS OF LIVER ENDOPLASMIC
RETICULUM MEMBRANES.** *(E.)* Meldolesi, J. (Inst.
Pharmacol., U. Milan, Italy), L. Vincenzi, P. Bassan and M. T.
Morini. *Lab Invest* 19(3):315-323, 1968.

The changes in the amount of liver microsomal phospholipids and the rate of their *in vivo* labeling after intraperitoneal injection of labeled inorganic phosphate were investigated in rats poisoned acutely and chronically with CCl_4. The levels of microsomal phospholipids were unchanged following acute poisoning with a single dose of 2.5 ml CCl_4/kg, but were slightly increased following chronic poisoning with 0.2 ml CCl_4 twice weekly for 24-28 weeks. ^{32}P incorporation into microsomal phospholipids was greatly increased over controls in the first few hr after acute poisoning, due to higher labeling of structural membrane phospholipids. The incorporation of glycine-1-^{14}C into microsomal membrane proteins was only slightly affected as demonstrated by microsomal subfractionation. It is felt that CCl_4 is capable of stimulating the rate of synthesis of microsomal membranes.

4522 **CELLULAR ADENOSINE TRIPHOSPHATE LEVELS IN LIVER AND KIDNEY DURING CCl_4 INTOXICATION.** *(E.)* Smuckler, E. A. (U. Washington Sch. Med., Seattle), M. Koplitz and G. E. Striker. *Lab Invest* 19(2):218-221, 1968.

Liver and kidney ATP levels were measured using the luciferase technique from 1 to 36 hr after administration of CCl_4 (0.25 ml/100 g) to male Sprague-Dawley rats via stomach tube without anesthesia. Sacrifice of control animals in an enriched oxygen atmosphere resulted in ATP values of 3 µmoles/g of wet weight of liver and 1.3 µmoles/g of wet weight of kidney. ATP values had fallen to 66% of the control levels within 1 hr following CCl_4 administration and decreased progressively to 25% by 24 hr. No changes were found in renal ATP levels. Sacrifice of animals without added oxygen revealed that control levels were significantly lower than those obtained in the enriched atmosphere and that the differences between the control and treated animals did not appear until later (12 hr). Administration of adenine (0.15 mmole/100 g) resulted in increased ATP levels in both control and treated animal livers. These data suggest that CCl_4 administration results in depressed hepatic ATP levels, possibly by increased destruction or utilization, and that two intracellular ATP pools may exist, a labile one and a more stable one.

4523 **EFFECT OF ALCOHOL ON THE LIVERS OF RATS. I. EFFECT OF A SINGLE INTOXICATING DOSE OF ALCOHOL ON THE LIVERS OF RATS FED A CHOLINE-DEFICIENT DIET OR A COMMERCIAL RATION.** *(E.)* Takeuchi, J. (Kanazawa U. Sch. Med., Japan), A. Takada, K. Ebata, G. Sawae and Y. Okumura. *Lab Invest* 19(2):211-217, 1968.

Studies were made to determine the acute effects of alcohol on the normal or fatty livers of 82 female Wistar rats (130-150 g). In 41 normal rats, a single dose of ethanol (1.5 ml/100 g body weight of a 50% solution by volume) via stomach tube resulted in an increase in hepatic triglyceride content; there was no significant change in serum enzymatic activities or hepatic cell necrosis. In 41 rats fed a choline-deficient diet for 5 weeks, the same dose of ethanol resulted in a significant elevation of SGOT 24 hr after treatment. Increases in SGPT and serum lactic dehydrogenase were statistically insignificant. The administration of a single dose of glucose, in place of but calorically equivalent to the alcohol dose, to 12 choline-deficient rats did not produce any change in serum enzyme activities or cause hepatic cell necrosis. The elevation of SGOT was more intense in rats with high hepatic triglyceride levels, and a positive correlation was noted between SGOT activities and hepatic triglyceride content 24 and 48 hr after ethanol administration. In 2 of 10 rats in which SGOT was elevated, scattered areas of hepatic cell necrosis were found. It is noted that some of the features of acute alcoholic hepatitis can now be reproduced in animals under these experimental conditions.

4524 **EFFECT OF LIVER INJURY ON THE ANTICONVULSANT ACTION OF CHLORODIAZEPOXIDE (LIBRIUM).** *(E.)* Krysicka-Doczkal, H. (Inst. Drugs, Warsaw, Poland). *Acta Physiol Pol* 18(5):670-678, 1968.

Experiments to determine the effect of liver injury (induced by 1.5 ml/kg CCl_4 intragastrically) on the anticonvulsant action of Librium (12.5 and 25.0 mg/kg in 5% gum arabic, 1 and 3 hr before electroshock and 3 and 10 days after CCl_4 administration) were performed on over 500 male and female rats. Liver injury was indicated 3 days after CCl_4 treatment by increased serum transaminase and bilirubin levels and serum turbidity. The reaction to electric shock was the same in healthy and CCl_4-poisoned animals. In healthy animals given 12.5 mg/kg Librium, however, the anticonvulsant effect was weaker 3 hr after administration than it was at 1 hr, while in the animals with liver injury it was higher. The effect of 12.5 mg/kg of Librium in poisoned animals was the same as that of 25 mg/kg in controls. Ten days after administration of CCl_4, the effect of both doses of Librium was only insignificantly higher than in controls. The mechanism by which liver injury enhances the anticonvulsant effect of Librium is not known but Librium seems to be metabolized more slowly or in a different manner by the injured liver.

4525 SEROTONIN INACTIVATION BEFORE AND AFTER PARTIAL HEPATECTOMY IN RATS.

(E.) Larmi, T. (Dept. Surg., U. Oulu, Oulun Lääninsairaala, Finland) and E. Heikkinen. *Acta Chir Scand* 134(5):363-365, 1968.

The capacity of rat liver to inactivate intraportally-administered serotonin was determined before and after partial hepatectomy. The control series (50 rats) received portal infusions of serotonin at 40 μg/min (17 rats), 60 μg/min (3 rats), 80 μg/min (26 rats) and 120 μg/min (4 rats). Serotonin inactivation occurred in 13 of the rats in the 80 μg/min group but not in the 120 μg/min group (too large a dose). After left-lateral lobectomy, serotonin inactivation was examined only in animals with adequate arterial pressure. In 2 of 6 rats, the remaining liver was still able to inactivate serotonin at 40 μg/min. After left lateral and middle lobectomy, 40 μg/min serotonin exceeded the inactivating capacity of the remaining liver, resulting in intrahepatic and extrahepatic degradation.

4526 IMMEDIATE EFFECT OF PARTIAL HEPATECTOMY ON PORTAL PRESSURE IN RATS.

(E.) Heikkinen, E. (Dept. Surg., U. Oulu, Oulun Lääninsairaala, Finland) and T. Larmi. *Acta Chir Scand* 134(5):367-368, 1968.

Studies were made to determine whether the portal circulation is impaired by an acute reduction in the amount of liver tissue. The control series (26 rats) had a mean portal pressure of 13.9 cm H_2O. After the left lateral lobe was removed in 8 rats, the mean portal pressure rose to 16.6 cm H_2O in the first 2 min but returned to a mean of 13.7 cm after 10 min. When the left lateral and middle lobes were removed in 17 rats, mean portal pressure rose to 16.5 cm H_2O but returned to 14.5 cm after 10 min. Blood pressure, pulse amplitude and pulse rate returned to original levels rapidly after lobectomy. It is suggested that even a considerable acute reduction in liver tissue does not perceptibly impair the blood pressure in the portal vein. This points to an acceleration of the microcirculation in the remaining liver tissue, perhaps through reserve shunts.

4527 HEPATOTOXICITY OF MERCAPTOPURINE.

(E.) Shorey, J. (U. Texas Southwest. Med. Sch., Dallas), S. Schenker, W. N. Suki and B. Combes. *Arch Intern Med* 122(1):54-58, 1968.

Previous reports of hepatic dysfunction during 6-mercaptopurine therapy have generally involved patients with either leukemia or chronic active hepatitis. The present paper reports the development of obstructive jaundice in two nonleukemic patients treated with this drug, one of whom died. A 45-yr-old man receiving 6-mercaptopurine at a dose of 150-200 mg/day (1.6-1.9 mg/kg/day) for membranous glomerulonephritis developed the characteristic signs of obstructive jaundice after 4 months of treatment (3 months at the higher dosage). When 6-mercaptopurine therapy was discontinued, liver function tests gradually returned to normal and the patient was discharged one week later. A 39-yr-old woman receiving 6-mercaptopurine at a dose of 100 mg/day (1.8 mg/kg/day) for systemic lupus erythematosus developed obstructive jaundice after 2.5 months. This patient died 15 days after admission despite discontinuation of 6-mercaptopurine and isoniazid. Autopsy findings of intrahepatic cholestasis and parenchymal cell necrosis confirmed that the jaundice was probably a direct result of 6-mercaptopurine toxicity. Corticosteroids would seem to have no place in the management of this complication, since both patients were receiving steroids (prednisolone and prednisone) at the time they developed jaundice.

4528 IRREVERSIBLE HYPOGLYCEMIA. *(E.)*

Arky, R. A., E. Veverbrants and E. A. Abramson. *JAMA* 206(3):575-578, 1968.

An augmentation of the hypoglycemic effect of insulin by alcohol was demonstrated in 5 insulin-dependent diabetics and in 6 healthy male volunteers undergoing a standard insulin-tolerance test. Permanent nervous system damage was found in 3 of the diabetics, hospitalized after an alcohol debauch, while the other 2 patients died without recovering from the initial coma. In the 6 volunteers, administration of 15% ethyl alcohol in saline (236 mg/min) 1 hr before the administration of insulin produced a significant delay in glucose rebound following hypoglycemia. The results indicate that alcohol inhibits some aspect of counterregulation, probably interfering with hepatic gluconeogenesis. The necessity of warning diabetics against the excessive use of alcohol is emphasized.

4529 INDUCED REGENERATION OF THE RAT LIVER DURING EXPERIMENTAL CIRRHOSIS.

(E.) Menyhárt, J. (U. Med. Sch., Budapest, Hungary) and L. Simon. *Acta Med Acad Sci Hung* 25(1):23-31, 1968.

Liver regeneration following partial hepatectomy was studied in male rats in which moderate or severe cirrhosis had been induced by the subcutaneous administration of CCl_4 (0.15 ml/100 g) every second day for 8-18 weeks. Partial hepatectomy was performed one week after the end of CCl_4 administration, and the degree of liver regeneration was measured after intervals of up to 6 months. In 73 rats with moderate cirrhosis, liver regeneration following partial hepatectomy was essentially normal and the mitotic response elicited by the partial hepatectomy resembled that in the control group. In 48 rats with severe cirrhosis, there was an almost complete loss of regenerative capacity and no mitotic response could be elicited by partial hepatectomy. It is concluded that, in the development of cirrhosis, the liver becomes less and less capable of normalization and eventually reaches a stage where can no longer show any tendency to recover, because the oliferative capability of its cells has been inhibited or blocked.

530 **FATAL INFECTIOUS MONONUCLEOSIS WITH LIVER FAILURE IN TWO SISTERS.** *.)* Harries, J. T. (Hosp. Sick Child., London, England) and . W. Ferguson. *Arch Dis Childh* 43(230):480-485, 1968.

31 **THE SPECTRUM OF HEPATOTOXICITY.** *(E.)* Zimmerman, H. J. (George Washington U. ch. Med., Washington, D. C.). *Georgetown Med Bull* 22(1): 19, 1968.

32 **EFFECT OF AN INDIGENOUS DRUG PREPARATION ON CARBON TETRACHLORIDE EPATOTOXICITY.** *(E.)* Srinivasan, S. (B. J. Med. Coll., oona, India), U. R. Prabhu and J. H. Balwani. *Ind J Med Res* 6(6):879-883, 1968.

533 **LETHAL HEPATIC NECROSIS AFTER THERAPY WITH IMIPRAMINE AND ESIPRAMINE.** *(E.)* Powell, W. J. Jr. (Massachusetts Gen. Iosp., Boston), J. Koch-Weser and R. A. Williams. *JAMA* 06(3):642-644, 1968.

534 **PREVENTION OF THE ETHANOL-INDUCED FATTY LIVER BY CHLORCYCLIZINE-INDUCED MAINTENANCE OF HEPATIC LIPID OXIDATION.** *E.)* Wooles, W. R. (Med. Coll. Virginia, Richmond) and R. J. Weymouth. *Lab Invest* 18(6):709-714, 1968.

535 **INFLUENCE OF VITAMIN E ON LIVER INJURY AND FAT METABOLISM.** *(E.)* Simko, V. (Res. Inst. Human Nutr. Bratislava, Czechoslovakia). *Acta Med Acad Sci Hung* 25(1):111-118, 1968.

536 **ALCOHOLIC HEPATITIS.** *(E.)* Wessler, S. (Jewish Hosp., St. Louis, Mo.) and L. V. Avioli. *JAMA* 203(10):865-870, 1968.

4537 **HEPATIC DISORDER AND SEVERE BLEEDING DIATHESIS FOLLOWING NITROFURANTOIN INGESTION.** *(E.)* Murphy, K. J. (Princess Alexandra Hosp., Queensland, Autralia) and M. D. Innis. *JAMA* 204(5):396-397, 1968.

4538 **CHOLESTATIC HEPATOSIS FOLLOWING TOXOGONIN THERAPY IN A CASE OF ALKYLPHOSPHATE POISONING.** *(Ger.)* Klemm, D. (Med. Clin., U. Freiburg i. Br., Germany), G. Blümchen, P. Pfannenstiel, W. Vogel and K. Beck. *Med Klin* 63(3):94-96, 1968.

4539 **EFFECT OF CARBON TETRACHLORIDE ON THE METABOLISM, STORAGE, AND EXCRETION OF SULFOBROMOPHTHALEIN.** *(E.)* Klaasen, C. D. (Dept. Pharmacol., Coll. Med., U. Iowa, Iowa City) and G. L. Plaa. *Toxic Appl Pharmacol* 12(1):132-139, 1968.

4540 **PROTECTIVE EFFECT OF MERCAPTOETHYLAMINE AND CYSTEINE AGAINST MONOCROTALINE INTOXICATION IN RATS.** *(E.)* Hayashi, Y. (U. Wisconsin Med. Sch., Madison) and J. J. Lalich. *Toxic Appl Pharmacol* 12(1):36-43, 1968.

4541 **AZATHIOPRINE EFFECT ON NORMAL CANINE LIVER AND KIDNEY FUNCTION.** *(E.)* Worth, W. S. (Colorado Med. Ctr., U. Colorado, Denver). *Toxic Appl Pharmacol* 12(1):1-6, 1968.

4542 **HEPATOTOXIC REACTIONS TO DRUGS.** *(Rev.)(Ger.)* Schmid, M. (Waid Munic. Hosp., Zurich, Switzerland). *Helv Med Acta* 34(Suppl. 47):15-23, 1968.

4543 **JAUNDICE DUE TO ORAL CONTRACEPTIVES. [CASE REPORT]** *(Fr.)* Borel, G. A. (Med. Clin. U. Lausanne, Switzerland), R. Picardi, J. H. Schelling and P. Magnenat. *Helv Med Acta* 34(Suppl. 47):109, 1968.

4544 **EFFECT OF CELL CYCLE ON RECOVERY FROM RADIATION DAMAGE IN THE MOUSE LIVER.** *(E.)* Coggle, J. E. (St. Bartholomew's Hosp. Med. Coll., London, England). *Nature* 217(5124):180-182, 1968.

4545 **STIMULATION OF PENTOSE PHOSPHATE PATHWAY DEHYDROGENASE ENZYME ACTIVITIES IN ETHIONINE-TREATED MICE.** *(E.)* Sie, H. G. (Tufts U. Sch. Med., Boston, Mass.) and W. H. Fishman. *Biochem J* 106(4):769-776, 1968.

4546 **THE 'NEUROTOXICITY' OF L-2,4-DIAMINOBUTYRIC ACID.** *(E.)* O'Neal, R. M. (Agric. Expt. Station, Oklahoma State U., Stillwater), C H. Chen, C. S. Reynolds, S. K. Meghal and R. E. Koeppe. *Biochem J* 106(3):699-706, 1968.

4547 **HEPATIC GLUTATHIONE CONCENTRATIONS LINKED TO ETHIONINE TOXICITY IN RATS.** *(E.)* Hsu, J. M. (VA Hosp., Baltimore, Md.), P. J. Buchanan, J. Anilane and W. L. Anthony. *Biochem J* 106(3):639-643, 1968.

4548 **THE INHIBITORY EFFECTS *IN VITRO* OF PHENOTHIAZINES AND OTHER DRUGS ON LIPID-PEROXIDATION SYSTEMS IN RAT LIVER MICROSOMES, AND THEIR RELATIONSHIP TO THE LIVER NECROSIS PRODUCED BY CARBON TETRACHLORIDE.** *(E.)* Slater, T. F. (U. Coll. Hosp. Med. Sch., London, England). *Biochem J* 106(1):155-160, 1968.

4549 **SULFONAMIDE HEPATIC INJURY: REVIEW OF THE LITERATURE AND REPORT OF A CASE DUE TO SULFAMETHOXAZOLE.** *(E.)* Dujovne, C. A. (VA Hosp., Washington, D. C.), C. H. Chan and H. J. Zimmerman. *New Eng J Med* 277(15):785-788, 1967.

4550 **DRUGS AND THE LIVER.** *(Rev.)(E.)* Sherlock, S. (U. London, England). *Brit Med J* 1(5586): 227-229, 1968.

4551 **INDICATIONS FOR DEBRIDEMENT IN HEPATIC TRAUMA.** *(E.)* Hicken, N. F. (Latter-Day Saints Hosp., Salt Lake City, Utah), A. J. McAllister and C. Edwards. *J Abdom Surg* 10(9):229-233, 1968.

4552 **SOME ASPECTS OF CARBON TETRACHLORIDE HEPATOTOXICITY.** *(E.)* Christie, G. S. (Dept. Path., U. Melbourne, Australia). *New Zeal Med J* 67(426):80-83, 1968.

4553 **ERYTHROCYTE ENZYMES IN HEPATOGENIC ANAEMIA.** *(E.)* Dán, S. (U. Med. Sch., Debrecen, Hungary), B. Sári, S. Kirillina and A. Kiss. *Acta Med Acad Sci Hung* 25(1):33-50, 1968.

4554 **BRONCHIAL ASTHMA AND TOXIC HEPATITIS.** *(E.)* Sotaniemi, E. (U. Oulu, Finland) and E. Huhti. *Ann Allergy* 26(3):151-154, 1968.

4555 **EARLY ELECTRON MICROSCOPIC CHANGES IN THE COURSE OF LIVER INJURY.** *(E.)* Butler, W. H. (Med. Res. Council Labs., Carshalton, Surrey, England). *New Zeal Med J* 67(426):18-23, 1968.

4556 **ERGOT POISONING IN ACUTE HEPATIC NECROSIS. [CASE REPORT]** *(E.)* Whelton, M. J. (Royal Free Hosp., London, England), A. Allaway, A. Stewart and L. Kreel. *Gut* 9(3):287-289, 1968.

See also abstract nos.: 3810,3813,3814,3815

4557 IS ACUTE ICTEROGENIC HEPATITIS ACCOMPANIED BY CHANGES IN THE HORMONAL REGULATORY MECHANISMS OF GALLBLADDER EMPTYING?

(It.) Fontana, G. (Inst. Spec. Med. Path., U. Bologna, Italy), G. Gasbarrini, P. Azzaroli, F. Faggioli and P. Vezzadini. *G Clin Med* 49(2):211-220, 1968.

In 7 patients with acute viral hepatitis, but with no history of prior biliary disease, determinations of the urinary cholecystokinin and anticholecystokinin 5-12 days after the appearance of jaundice revealed a significant decrease in cholecystokinin activity, particularly in response to intraduodenal sorbitol (15 g) or corn oil (30 cc). The hormonal activity was estimated by determining the changes in pressure in the guinea pig gallbladder after i.v. injection of the urine. Under basal conditions, the urinary cholecystokinin activity in these 7 patients averaged 16 mm (range 11-20 mm), compared to 20 mm (11-26 mm) in 20 normal controls, and the anticholecystokinin activity averaged 55 mm (41-68 mm) compared to 63 mm (56-74 mm) in controls. Two hours after administration of sorbitol, the urinary cholecystokinin activity had risen to only 29 mm (24-32 mm) in the patients compared to 43 mm (26-52 mm) in controls, and 2 hr after administration of corn oil the urinary cholecystokinin activity was 35 mm (21-48 mm) in the patients and 56 mm (41-67 mm) in controls. The decrease in urinary anticholecystokinin activity following stimulation with sorbitol or corn oil was about the same in patients and controls. In 2 patients (one studied 21 days after the appearance of jaundice, during the recovery period, and one studied 43 days after the appearance of jaundice, following clinical cure), repeat determinations of the urinary cholecystokinin and anticholecystokinin activity yielded essentially normal results.

4558 ACUTE PANCREATITIS WITH INFECTIOUS HEPATITIS.

(E.) Achord, J. L. (Emory U. Sch. Med., Atlanta, Ga.). *JAMA* 205(12):129-132, 1968.

Case reports of 4 patients with infectious hepatitis having evidence of acute pancreatitis are presented. Pancreatitis was seen at autopsy in 2 patients who died of acute fulminant hepatitis. The serum and urine of 1 patient showed electrophoretic migration patterns of amylolytic activity identical to that of saline extracts of human pancreas. One patient showed only mild increases of urine amylase levels but had a classical "reversed 3 sign" on X-rays of the upper gastrointestinal tract that disappeared within 8 days. These case reports support the concept that the pancreas can be involved during infectious hepatitis.

4559 SICKLE CELL DISEASE AND VIRAL HEPATITIS.

(E.) Barrett-Conner, E. (Jackson Memorial Hosp., Miami, Fla.). *Ann Intern Med* 69(3):517-527, 1968.

The clinical, laboratory, and liver biopsy pictures in 6 patients with predominantly S hemoglobin and 10 patients with sickle cell trait, all having viral hepatitis were contrasted with patients with viral hepatitis who had no hemoglobinopathy. Anemic patients without sickle cell disease having viral hepatitis were also used for comparison. Clinically, there was no significant difference in duration of illness before hospitalization or in symptoms in any of the groups. The only significant difference in liver function studies was severe hyperbilirubinemia in patients with sickle cell anemia. Biopsy specimens consistent with viral hepatitis were similar in all groups. No sickling of red blood cells or hepatic fibrosis was observed in the patients with sickle cell anemia. It seems probable that some sickle cell patients with jaundice attributed solely to intrahepatic sickling have unrecognized viral hepatitis.

4560 ACUTE-HEPATIC COMA TREATED BY CROSS-CIRCULATION WITH A BABOON AND BY REPEATED EXCHANGE TRANSFUSIONS.

(E.) Saunders, S. J. (Groote Schuur Hosp., Cape Town, S. Africa), J. Terblanche, S. C. W. Bosman, G. G. Harrison, R. Walls, R. Hickman, J. Biebuyck, D. Dent, S. Pearce and C. N. Barnard. *Lancet* 2(7568):585-588, 1968.

A white 29-yr-old female with severe hepatic failure secondary to hepatitis was in a deep coma for 7 days. Six exchange perfusions were performed during this time with slight improvement. On the 8th day high-brain-stem dysfunction became apparent. With cessation of spontaneous respiration irreversible upper-brain-stem and medullary lesions were thought to be present. Cross-circulation through a baboon was performed after its blood had been replaced with human blood compatible with the patient's blood. After 1 hr of cross-circulation, spontaneous breathing recommenced. Analysis of blood pCO_2 levels confirmed the impression that spontaneous respiration was due to the cross-circulation and not to any change in ventilation. There was no immediate or subsequent evidence of harm to the patient. After the 9-hr procedure, signs of upper-brain-stem damage persisted. A steady dramatic recovery was then made, with the patient becoming fully conscious and normally oriented with no abnormal neurological signs. One month after the procedure the patient was still fully conscious with no abnormal signs. It seems that cross-circulation between man and baboon is a safe procedure and may provide an additional method of treatment of liver failure.

4561 METABOLISM OF INTRAVENOUSLY INJECTED ISOTOPIC CHOLIC ACID IN VIRAL HEPATITIS.

(E.) Theodor, E. (Cornell U. Med. Coll., New York City), N. Spritz and M. H. Sleisinger. *Gastroenterology* 55(2):183-190, 1968.

Tritiated cholic acid was administered intravenously to 8 patients with viral hepatitis. The half-time for disappearance of the isotope from the plasma 10 to 60 min after injection ranged from 22.5 to 125 min with a mean of 62.6 ± 43.2 min. These values are significantly prolonged ($p < 0.02$) when compared with previously reported normal groups (12.6 ± 1.6 min). In 6 patients, isotope conjugation of 45.5% ± 14.8 at 20 min and 72% ± 16.8 at 60 min after injection was noted. These values are lower than for normal subjects (63.5% ± 16.7 and 95% ± 4.7 resp.). At 24 hr after injection plasma radioactivity ranged from 4% to 53% of the 10 min level; at 96 hr radioactivity ranged from 2% to 32%. In 4 subjects with complete 96 hr urine collections, urinary radioactivity ranged from 3.1% to 35.1% of the injected dose. Previous studies with 4 normal subjects in whom urine radioactivity was cumulated for 7 days did not exceed 0.12% of the injected dose. In 2 patients, cholic acid pool size and daily production were at or below the lower limit of that reported for normal subjects. These findings suggest that the entire hepatic bile acid pool is abnormally low in patients with hepatitis.

4562 RESULTS OF THE HEPATITIS INFECTIOUS MONONUCLEOSIS (HIM) TEST IN A GROUP OF SWEDISH BLOOD DONORS AND A GROUP OF HEPATITIS PATIENTS.

(Sw.) Iwarson, S. (Infect. Dis. Hosp., Göteborg, Sweden) and O. Rawling. *Nord Med* 80(31):1016-1019, 1968.

The HIM test developed by Bolin Labs. in the USA revealed positive agglutination reactions in 56% of a group of 429 Swedish blood donors with no known history of hepatitis or infectious mononucleosis, 94% of 70 patients with viral hepatitis (diagnosed clinically and in some cases by liver biopsy), 76% of 55 patients with jaundice of nonhepatitic origin (gallstones, biliary neoplasms, toxic liver disease), and 67% of 57 control patients with apparently normal livers. Quantitative studies revealed titers of over 1/40 in 48% of 49 viral hepatitis patients, 38% of 37 patients with previous viral hepatitis, and 30% of 43 nominally healthy blood donors; titers of less than 1/20 were obtained in 4%, 16% and 26% of the 3 groups, resp., but 44-48% of all 3 groups had titers between 1/20 and 1/40. A negative HIM test is therefore a fairly certain indication of the absence of hepatitis virus, and may be useful as a way of reducing the incidence of transfusion hepatitis. A positive HIM test, on the other hand, is of uncertain significance and would be of little value in the differential diagnosis of idiopathic jaundice.

4563 STUDIES IN NEONATAL HEPATITIS AND BILIARY ATRESIA. II. THE EFFECT OF DIAGNOSTIC LAPAROTOMY ON LONG-TERM PROGNOSIS OF NEONATAL HEPATITIS.

(E.) Thaler, M. M. (Harvard Med. Sch., Boston, Mass.) and S. S. Gellis. *Amer J Dis Child* 116(9):262-270, 1968.

Clinical, biochemical and histological data from the first 4 months of life in 26 infants who were operated upon and 36 infants who were not operated upon for neonatal hepatitis were categorized and compared. Advanced cirrhosis developed in 61.5% of those operated upon and in 19.4% of those not operated upon; 5 infants died. Flocculation tests, serum transaminases, total serum protein and γ-globulin levels were completely similar in both groups of infants. The fecal excretion of ^{131}I-labeled Rose Bengal was the only indicator which differed significantly in the two groups (9.2% in infants undergoing surgery and 32.3% in infants not undergoing surgery). Rose Bengal studies showed that 20% of the cases of neonatal hepatitis had total obstruction at some point during the course of the disease. These indicator values did not correlate with conjugated serum bilirubin levels which were used in the selection of most cases for exploratory surgery (the more severe cases being selected for exploration). The findings indicate that the higher incidence of sequelae in infants operated on was not due to the greater severity of the disease process but was associated with trauma sustained during surgery or general anesthesia. The development of cirrhosis did not correlate with the duration or use of any single anesthetic agent. The extent of surgical exploration varied greatly in patients who developed cirrhosis.

4564 STUDIES IN NEONATAL HEPATITIS AND BILIARY ATRESIA. I. LONG-TERM PROGNOSIS OF NEONATAL HEPATITIS.

(E.) Thaler, M. M. (Harvard Med. Sch., Boston, Mass.) and S. S. Gellis. *Amer J Dis Child* 116(9):257-261, 1968.

Among 114 infants with prolonged idiopathic obstructive jaundice, 91 survived 4 months after birth and 62 were followed for 12 months or more and form the basis of this report. Cirrhosis was not present before the first year of life. Advanced cirrhosis occurred later in 37% of the cases and elevated alkaline phosphatase levels were present in 19.5%; the remaining 43.5% were well by clinical standards. Neither the clinical or biochemical features (birth weight, gastrointestinal disturbances, anemia, alkaline phosphatase and SGOT levels and total protein) nor liver biopsy taken during the 4-month period were of value in predicting which infant would develop cirrhosis. Total and conjugated bilirubin levels were insignificantly higher in those who developed cirrhosis. The most striking feature of the group which progressed to chronic disease was the high percentage of infants who had undergone exploratory laparotomy to rule out biliary atresia. Of 23 infants with cirrhosis at one year of age or later, 16 had undergone surgery while of 27 fully recovered infants, only 4 had undergone surgery.

4565 VIRAL HEPATITIS ASSOCIATED WITH ILLICIT PARENTERAL USE OF DRUGS.

(E.) Dismukes, W. E. (New Jersey State Dept. Health, Trenton), A. W. Karchmer, R. F. Johnson and W. J. Dougherty. *JAMA* 206(5):1048-1052. 1968.

Case records for 3787 cases of viral hepatitis occurring in New Jersey during a 45-month period (July 1963 through March 1967) were analyzed for histories of contact, transfusion, illicit parenteral use of drugs, and medical inoculation (including blood tests, skin tests, vaccinations, dental work and tattooing); 1583 of these cases (15-29 yr age group) were cross-checked with the state narcotics file. There were twice as many males as females in this age group. Parenteral drug use was known in 183 (11.6%, 166 males and 17 females) of these cases (only 6 of the 2204 cases outside this age group were known users). An additional 79 persons (74 males and 5 females) were suspected of parenteral drug use. These 262 cases represented 16.6% of all cases of viral hepatitis in the 15- to 29-yr-old age group in New Jersey. A public health hazard is created when the drug user attempts to finance his habit by the frequent sale of blood as a donor. The data indicate that illicit parenteral use of drugs accounts in a large part for the unusually high incidence of hepatitis among the young adult males in New Jersey and contributes significantly to hepatitis morbidity.

4566 HEPATITIS AMONG MISSIONARIES IN ETHIOPIA AND SUDAN: SUSCEPTIBLES AT HIGH RISK.

(E.) Frame, J. D. (Sch. Publ. Health Admin. Med., Columbia U., New York City). *JAMA* 203(10):819-826, 1968.

The private medical and service records of 2 missionary organizations were investigated for the period from 1945 to 1965 to determine the incidence of hepatitis. Among a group of

178 adult missionaries in Ethiopia, icteric hepatitis occurred at an annual rate of 5.5%; in another group of adults in Ethiopia (57), the annual rate was 3.9%. Among 66 adults in Sudan, the rate was 2.0%. The incidence among children tended to be lower. The incidence of hepatitis continued at a high level for many years. As a prophylactic, γ-globulin would have been required for many years, not only for the first few. Not more than 55% appeared likely to develop immunity because of inapparent (anicteric) infection. The rate of second bouts of icteric hepatitis was about one fifth the rate for first attacks. The presence of a cold season in the climate may have contributed to the high incidence of hepatitis in Ethiopia as compared to Sudan.

4567 **FREEZE-BALL HEPATITIS.** *(E.)* Reynolds, R. D. (David Grant USAF Hosp., Travis AFB, Calif.), J. J. Simerville, K. S. Shepard, J. P. Fiore, C. A. Keck and D. C. Metheny. *Arch Intern Med* 122:48-49, 1968.

Exposure to leaky plastic "freeze-balls" used to cool food and drinks resulted in hepatitis after a uniform incubation period in all 10 members of a family, in whom hepatitis was diagnosed on the same day. The parents were 37 and 40 yr old and the children ranged in age from 2 to 13. There was a 1-month exposure to the contaminated freeze-balls with the last exposure 37 days prior to hospital admission. Organisms isolated from the freeze-balls suggested fecal contamination. Presenting symptoms, abnormal laboratory studies, and the clinical course varied widely in the family. The disease was most severe in the parents, and more severe in the older children than in the younger children. The youngest children were asymptomatic. Anicteric hepatitis, present in 6 of the 10 patients, was milder and abnormalities of liver function were of shorter duration than in the icteric patients.

4568 **CHRONIC HEPATITIS: EFFECT OF PROLONGED SUPPRESSIVE TREATMENT AND COMPARISON OF AZATHIOPRINE WITH PREDNISOLONE.** *(E.)* Mackay, I. R. (Royal Melbourne Hosp., Victoria, Australia). *Quart J Med* 37(147):379-392, 1968.

Two groups of 15 patients with active, chronic, autoimmune hepatitis were used to study the efficacy of prednisolone (40-60 mg/day initially) and azathioprine (100-200 mg/day initially) in suppressing the activity of the disease, allowing improvement in liver function, and effecting a permanent cure during a two- to three-year course of treatment. Serial measurements were made of the SGOT to assess hepatocellular necrosis, serum bilirubin, serum albumin and BSP excretion to assess liver function, and serum gamma globulin to assess the immune reaction in the liver. All the biochemical indices for both drug groups showed improvement after treatment, and both prednisolone and azathioprine were equally effective in maintaining quiescence. While there was successful suppression of disease activity during treatment, there were few proven cures, since upon withdrawal of treatment only 2 prednisolone-treated patients and 5 azathioprine-treated patients remained in remission. It is concluded that in active chronic hepatitis, indices of liver cell necrosis, hepatocellular function, and the immune reaction in the liver are interrelated variables, and that liver function improves as necrosis stops.

4569 **ABSENCE OF CIRCULATING INTERFERON IN PATIENTS WITH INFECTIOUS AND SERUM HEPATITIS.** *(E.)* Wheelock, E. F. (Western Res. U. Sch. Med., Cleveland, Ohio), S. Schenker and B. Combes. *Proc Soc Exp Biol Med* 128(1):251-253, 1968.

Serum samples of 34 patients in various stages of acute and chronic hepatitis were collected during a 7-month period and assayed for interferon in an attempt to discover if *in vivo* fluctuations in interferon production might be responsible for the variable clinical course which is seen in both infectious and serum hepatitis. The diagnosis of infectious and serum hepatitis was based on accepted clinical and laboratory criteria. In the 226 serum samples taken there was no virus-inhibitory activity characteristic of interferon.

4570 **EFFECT OF CORTICOSTEROID THERAPY ON BROMSULPHTHALEIN EXCRETION IN ACTIVE CHRONIC HEPATITIS.** *(E.)* Cook, G. C. (Royal Free Hosp., London, England), M. Velasco and S. Sherlock. *Gut* 9(3):270-283, 1968.

Serial intravenous sulfobromophthalein (BSP) disappearance curves were recorded in 22 patients with active chronic hepatitis who had not previously received corticosteroids. The patients were randomly divided into two groups, with the first group receiving 15 mg of prednisolone daily while the second group was not treated with corticosteroids and thus acted as a control. BSP retention was found to decrease significantly more rapidly in the treated group than in the controls. While the transport maximum (Tm) for BSP remained relatively constant for both groups, relative hepatic storage increased in the treated group. Plasma conjugated BSP also showed a significant increase after corticosteroid treatment. It is noted that a decrease in BSP retention has been shown to correlate well with improvement in other biochemical indices of hepatocellular function.

4571 **A CLASSIFICATION OF CHRONIC HEPATITIS.** *(E.)* de Groote, J. (Munic. Hosp., Kassel, Germany), V. J. Desmet, P. Gedigk, G. Korb, H. Popper, H. Poulsen, P. J. Scheuer, M. Schmid, H. Thaler, E. Uehlinger and W. Wepler. *Lancet* 2(7568):626-628, 1968.

4572 **NEONATAL HEPATITIS IN CONGENITAL RUBELLA: A HISTOPATHOLOGICAL STUDY.** *(E.)* Strauss, L. (Mount Sinai Hosp., New York City) and J. Bernstein. *Arch Path* 86(3):317-327, 1968.

4573 **THE CLINICAL PICTURE OF HEPATITIS IN CHRONIC BRUCELLOSIS.** *(E.)* Boron, P. (Clin. Infect. Dis., Med. Acad., Bialystok, Poland). *Epidemiological Rev* 21(3-4):149-155, 1967.

4574 **GIANT CELL HEPATITIS.** *(E.)* Reddy, D. J. (Jawaharlal Inst. Postgrad. Med. Educ. & Res., Pondicherry, India), M. Madhvan, T. Bhama and V. P. Jayakrishnan. *Indian J Pediat* 35(241):113-114, 1968.

4575 **ANALYSIS OF DEATHS FROM VIRAL HEPATITIS IN WARSAW IN THE YEARS**

1959-1966. *(E.)* Magdzik, W. (Epidemiol. Dept., State Inst. Hyg., Warsaw, Poland). *Epidemiological Rev* 21(3-4):219-232, 1967.

4576 **ANALYSIS OF ADRENAL CORTICAL FUNCTION IN VIRAL HEPATITIS.** *(Fr.)* Vanista, J. (Infect. Dis. Clin., Bulovka Hosp., Prague, Czechoslovakia) and K. Mašek. *Acta Hepatosplen (Stuttgart)* 15(3):150-153, 1968.

4577 **VIRAL HEPATITIS: REVIEW OF HOSPITAL CASES DURING 1966.** *(It.)* Carrera, F. (Varese Dist. Hosp., Italy) and A. Lelli. *Minerva Med* 59(49): 2852-2859, 1968.

4578 **OBSERVATIONS ON THE COURSE AND DEVELOPMENT OF VIRAL HEPATITIS WITH MASSIVE NECROSIS.** *(It.)* Gioannini, P. (Inst. Gen. Clin. Med. Ther., U. Sienna, Italy), C. A. Boggiano and G. Scalise. *G Mal Infett* 20(3):270-277, 1968.

4579 **EPIDEMIOLOGY AND PROGNOSIS OF INFECTIOUS HEPATITIS IN EISENHUTTENSTADT.** *(Ger.)* Weigl, E. (Munic. Health Svc., Eisenhuttenstadt, Germany) and D. Krieg. *Deutsch Gesundh* 23(27):1267-1271, 1968.

4580 **PANMYELOPHTHISIS FOLLOWING VIRAL HEPATITIS.** *(Ger.)* Stieglitz, R. (Path. Inst., Humboldt U., Berlin, Germany) and D. Kranz. *Deutsch Gesundh* 23(6):241-245, 1968.

4581 **GAMMA-M GLOBULIN IN VIRAL HEPATITIS.** *(Fr.)* Schmidt, P. M. (Med. Polyclin., U. Lausanne, Switzerland) and J. R. Hofstetter. *Schweiz Med Wschr* 98(6):184-186, 1968.

4582 **UNSUSPECTED INFECTIOUS HEPATITIS IN SURGICAL PATIENTS.** *(E.)* Marx, G. F. (Albert Einstein Med. Coll., New York City), M. Nagayoshi, J. A. Shoukas and S. B. Wollman. *JAMA* 205(11):793-795, 1968.

4583 **THE FAMILIAL SPREAD OF INFECTIOUS HEPATITIS AMONG CHILDREN.** *(Ger.)* Marinescu, G. (V. Babes Hosp. Infect. Dis., Bucharest, Romania), I. Predescu, M. Angheluta, T. Olariu and S. Stefanescu. *Munchen Med Wschr* 110(6):325-327, 1968.

4584 **THE TREATMENT OF ACUTE VIRAL HEPATITIS.** *(Ger.)* Kühn, H. A. (Med. Clin., Justus-Liebig U., Giesen, Germany) and E. Kuntz. *Med Klin* 62(49):1893-1898, 1967.

4585 **THE RISK OF INFECTIOUS HEPATITIS IN A DIALYSIS WARD.** *(Ger.)* Kopp, H. (Munic. Hosp., Kassel, Germany). *Med Klin* 62(48):1857-1858, 1967.

4586 **THE TREATMENT OF ACUTE VIRAL HEPATITIS.** *(Rev.)(Ger.)* Kühn, H. A. (Med. Clin., Justus-Liebig U., Giessen, Germany) and E. Kuntz. *Med Klin* 62(48):1853-1856, 1967.

4587 **LUPOID HEPATITIS FOLLOWING ADMINISTRATION OF PENICILLIN: CASE REPORT AND IMMUNOLOGICAL STUDIES.** *(E.)* Girard, J. P. (Med. Clin., U. Geneva, Switzerland), B. Haenni, R. Bergoz, Y. Kapanci and A. Cruchaud. *Helv Med Acta* 34(1):23-35, 1968.

4588 **IMMUNOLOGICAL ASPECTS OF ACTIVE CHRONIC HEPATITIS AND PRIMARY BILIARY CIRRHOSIS.** *(E.)* Sherlock, S. (Royal Free Hosp., London, England). *Acta Gastroent Belg* 31(6):416-423, 1968.

4589 **SOME OBSERVATIONS ON INDIAN CHILDHOOD CIRRHOSIS AND INFECTIVE HEPATITIS.** *(E.)* Prasad, L. S. (Patna U., India) and S. Mallick. *Indian Pediat* 5(6):241-252, 1968.

4590 **HEMOCHROMATOSIS FOLLOWING HEPATITIS IN A PATIENT WITH SYSTEMIC IRON OVERLOAD.** *(E.)* Klion, F. M. (Mount Sinai Hosp., New York City) and F. Schaffner. *Arch Path* 86(3):342-347, 1968.

4591 **REPORT OF A CASE OF LUPOID HEPATITIS.** *(Fr.)* Dagenais-Pérusse, P. (Sainte-Jeanne-d'Arc Hosp., Montreal, Canada), E. Baril, R. Carle, N. R. Bouziane, J. P. Machuca, M. Del Valle, M. Doncá and A. Pelfréne. *Un Med Canada* 97(9):1255-1259, 1968.

4592 **IMMUNOSUPPRESSIVE THERAPY WITH ANTIMETABOLITES IN CHRONIC HEPATOPATHIES.** *(Fr.)* Demeulenaere, L. (Med. Clin., U. Gand, Belgium), J. van Egmond, R. Lacres and R. Rottiers. *Acta Gastroent Belg* 31(6):424-434, 1968.

4593 **SPECTRUM OF LIVER DISEASE AFTER VIRAL HEPATITIS.** *(Rev.)(E.)* Levine, R. A. (State U. New York Downstate Med. Ctr., Brooklyn). *New York J Med* 68(14):1919-1930, 1968.

4594 **HEPATITIS AND RENAL FAILURE IN PREGNANCY: REPORT OF A PATIENT.** *(E.)* Douglas, J. M. (Cleveland Clin. Found., Ohio), R. G. Farmer, D. G. Vidt and J. P. Thomas. *Arch Intern Med* 122:59-62, 1968.

See also abstract nos.: 3914,3919

4595 THE TREATMENT OF CIRRHOSIS WITH DIURETICS, CORTICOTHERAPY AND ASPIRATION ASSOCIATED WITH A SALT-FREE DIET: A CONTROLLED THERAPEUTIC TRIAL. *(Fr.)* Camatte, R. (St. Marguerite Hosp., Marseille, France), A. Gerolami, Y. Fiastre, M. Gaini, A. Gauthier and H. Sarles. *Arch Franc Mal Appar Dig* 57(4/5):459-466, 1968.

A controlled randomized trial of diuretics and corticotherapy in the treatment of 3 groups of patients with cirrhosis and ascites indicated that neither diuretics nor corticosteroids have any significant effect on the long-term prognosis, although corticosteroids may have a beneficial effect on the general condition. During a follow-up of 3-30 months, 23 of the 55 patients died, including 8 of 20 treated by a salt-free diet plus aspiration of ascites fluid 1-3 times weekly, 8 of 17 receiving the same treatment plus corticotherapy (usually prednisone, 30 mg/day initially followed by gradual reduction), and 7 of 18 treated with a more-or-less salt-free diet plus diuretics (chlorothiazide, initially 1.0-1.5 g/day for 8-20 days, then reduced to 0.5 g 2-7 times weekly for 6 weeks, alone or with aldactone, 200-300 mg/day for 7-21 days followed by 100 mg 2-7 times weekly for 2-3 weeks). Persistent ascites was seen in 50% of all 3 groups after 21-24 months, although the initial results were better in the group given corticosteroids. The number of pathological signs (ascites, edema of the lower limbs, jaundice, cutaneous or gastrointestinal bleeding, asthenia, infection, encephalopathy, coma, BSP retention above 30%, or hypoprothrombinemia) per patient fell to about 1.0 in the corticosteroid group after 18 months, compared to 1.8 in those treated by diuretics and 3.1 in those treated by diet plus aspiration; the initial results were about the same in all 3 groups, however. It is concluded that the most important elements in the treatment of cirrhosis are correction of the electrolyte balance and blood volume, appropriate dietary restrictions (reduced protein in the case of encephalopathy), the withdrawal of alcohol, and effective treatment of any infections.

4596 DYSGLOBULINEMIC HEPATIC CIRRHOSIS DIAGNOSED ON THE BASIS OF AN IMMUNOELECTROPHORETIC STUDY OF CIRRHOTIC SERUM. *(Sp.)* Guarner, A. (Santa Cruz y San Pablo Hosp., Barcelona, Spain), J. Balanzo and R. Vidal-Ribas. *Rev Esp Enferm Apar Dig* 27(5):671-687, 1968.

A review of the clinical symptoms, autopsy findings (in 20 cases) and the results of serum immunoelectrophoresis using horse antihuman immune-serum in 25 patients (11 men and 14 women, 29-72 yr old) with cirrhosis of the liver indicated that 14 had ordinary cirrhosis, 6 had atypical polyclonal hyperproteinemic cirrhosis, and 5 had monoclonal dysglobulinemic cirrhosis (including one patient with myelomatosis and selectively increased IgA and 4 patients with selective increases in IgM due to Waldenström's disease). Based on these results and a review of the literature, it is felt that all patients with cirrhosis can be divided into these 3 main groups: ordinary cirrhosis, characterized by irreversible hepatic fibrosis resulting in portal hypertension, ascites, edema, malnutrition and esophageal varices, and accompanied by a moderate increase in all 3 types of immunoglobulin; atypical cirrhosis characterized by a slow reversible course, with lymphoreticular infiltration of the liver and bone marrow and a marked increase in all 3 types of immunoglobulin; and dysglobulinemic cirrhosis, characterized by lymphoplasmocytic infiltration of the hepatic parenchyma and bone marrow, hepatosplenomegaly, signs of hypersplenism, frequent hemorrhagic diathesis and neurological symptoms, and accompanied by increases in either IgA or IgM. It is postulated that the frequency of the various forms is probably about the same as that encountered in this group of 25 patients.

4597 DERANGEMENTS OF HEPATIC VASCULATURE AND CIRCULATION IN LIVER CIRRHOSIS. *(E.)* Horiguchi, M. (Jikei U. Sch. Med., Tokyo, Japan). *Jikei Med J* 13(3):183-196, 1966.

Histological examination of the liver for development of collaterals and attenuation of the hepatic blood vessels was made in 200 Wistar strain male rats whose livers were experimentally damaged for 2 to 7 weeks to produce the various stages leading to cirrhosis. With progression of the cirrhotic process, the hepatic vein underwent flattening, distortion, and flexion prior to any changes in the portal vein or hepatic artery. Infusion of T1824 into the portal vein of a normal liver showed staining of the parenchyma before it appeared in the hepatic vein. Infusion of T1824 into the portal vein of livers damaged for 3 weeks appeared in the hepatic vein before it stained the liver parenchyma. This may indicate the presence of portohepatic venous shunts and a disturbance in intralobular circulation. Regeneration was thought to be the most important factor in the development of hepatic vascular derangements and the decrease in the hepatic venous outflow tract was thought to be the most important cause of portal hypertension.

4598 PROPHYLACTIC PORTACAVAL ANASTOMOSIS IN CIRRHOTIC PATIENTS WITH ESOPHAGEAL VARICES: INTERIM RESULTS, WITH SUGGESTIONS FOR SUBSEQUENT INVESTIGATIONS. *(E.)* Conn, H. O. (VA Hosp., West Haven, Conn.) and W. W. Lindenmuth. *New Eng J Med* 279(14):725-732, 1968.

In a prospective follow-up study of 56 cirrhotic men who had not previously bled from esophageal varices, 25 of whom were given prophylactic portacaval shunts (end-to-side in 21, side-to-side in 4, with 2 late postoperative deaths due to peritonitis), the incidence of hemorrhage from esophageal varices was reduced from 39% in controls (12 cases) to 1% in the treated group (1 case). The mortality during a follow-up period of 51-108 months, however, was 68% in the treated group (due mainly to hepatic failure) compared to 50% in the controls (due mainly to variceal hemorrhage). Control patients died 4-106 months (mean 40 months) after inclusion in the program, 6 dying of variceal hemorrhage, 4 of gastrointestinal hemorrhage, 2 of hepatic failure and 2 of pancreatic carcinoma. Treated patients died 2-52 months (mean 28 months) after inclusion, 7 dying of hepatic failure and 1 each of esophageal and gastrointestinal hemorrhage. Esophageal varices persisted in 20 of 27 controls and 2 of 23 treated patients (both with thrombotic portacaval shunts). Portal-systemic encephalopathy was noted in 6 controls and 6 treated, while peptic ulcers were found in 5 of each group. Although 59-69% of both groups continued to drink alcoholic beverages, 56-63% of both groups experienced a satisfactory degree of social rehabilitation. Before surgery, the two groups were similar in incidence of jaundice, spider angiomata, hepatosplenomegaly and ascites, and in the magnitude of the esophageal varices, the splenic pulp pressure, and the results of the ammonia tolerance test. The results of this study show that prophylactic portacaval shunt in unselected cirrhotic patients does not reduce mortality. However, all 12 of the control patients who bled from esophageal varices had had ascites, as well as more frequent signs of decompensated cirrhosis, more abnormal liver-function tests and more severe portal hypertension than the controls who did not bleed from their varices. Ascites may thus help in the identification of patients with an increased risk of variceal bleeding, who would therefore benefit most from a portacaval shunt.

4599 BROADENING THE INDICATIONS FOR PORTACAVAL SHUNT SURGERY BY TREATING POSTOPERATIVE HEPATIC FAILURE WITH PERITONEAL DIALYSIS. *(Ger.)* Kraemer, H. J. (Munic. Hosp., Wiesbaden, Germany). *Munchen Med Wschr* 110(7):406-409, 1968.

In 2 cirrhotic patients (51-yr-old woman and 39-yr-old man) subjected to portacaval shunt surgery for bleeding esophageal varices despite a very poor prognosis (pathological liver function tests, ascites, recurrent bleeding, and a score of 21 on the chart of Hamelmann *et al* as modified by Leger), postoperative hepatic failure (serum bilirubin up to 5-30 mg%, ammonia up to 180-250 μg%) was successfully treated by immediate peritoneal dialysis with large volumes of fluid (up to 33 liters/day for 6-7 days). Large amounts of bilirubin and ammonia were eliminated and both patients recovered (despite 6 days of postoperative coma in the woman). On the basis of these two cases, it is suggested that the criteria for portacaval shunt surgery can be relaxed to include patients that would have been rejected because of factors such as previous hepatic coma or precoma, an age of 60 or over, more than one recurrence of bleeding, ascites refractory to treatment, temporary ascites, total serum bilirubin above 2 mg% or in the range of 1.2-2.0 mg%, serum albumin of 3.0 g% or less, prothrombin index of 50% or less, Takata reaction of 50 mg% and below, platelet count of 100,000 or less, and edema of the extremities. If weights varying from 2 to 6 are assigned to these various factors, a total score of 17 or more is said to indicate a very poor prognosis, but this can apparently now be overcome by postoperative peritoneal dialysis.

4600 HYPERKALEMIC CHANGES DURING SPIRONOLACTONE THERAPY FOR CIRRHOSIS AND ASCITIS, WITH SPECIAL REFERENCE TO HYPERKALEMIC INTERMITTENT PARALYSIS. *(E.)* Rado, J. P. (Janos Hosp., Budapest, Hungary), J. Marosi, L. Szende and J. Tako. *J Amer Geriat Soc* 16(8):874-886, 1968.

The frequency and clinical significance of the hyperkalemia associated with spironolactone therapy was studied based on 755 serum potassium determinations in 29 patients with cirrhosis and ascitis. The patients were grouped as follows: 1) controls treated intermittently with combinations of conventional diuretics; 2) patients treated with spironolactone alone; and 3) nonazotemic and 4) slightly azotemic patients treated with spironolactone plus diuretics. Hyperkalemia was found in 3.3% of 302 control serum potassium determinations, and in 48% of 325 determinations made during spironolactone therapy. The increase in serum potassium concentration was more marked in the slightly azotemic group, although the initial levels were no higher than in the other groups. Intermittent hyperkalemic paralysis associated with spironolactone therapy occurred in 5 patients. Studies of excretory patterns suggest a distal as well as a proximal tubular site of action of spironolactone.

4601 THE ACIDIC GLYCOSAMINOGLYCANS IN THE CONNECTIVE TISSUE OF NORMAL AND CIRRHOTIC HUMAN LIVER. *(Ger.)* Delbruck, A. (Cent. Lab., Eastern City Hosp., Hannover, Germany). *Z Klin Chem* 6(5):460-466, 1968.

The total acidic glycosaminoglycan content of a normal human liver taken from a 55-yr-old accident victim was 11.3 mg, compared to 63.1 mg for a cirrhotic liver taken from a 53-yr-old man who died in hepatic coma. In the normal liver, the acidic glycosaminoglycans consisted of about 36% heparan sulfate and 55.2% dermatan sulfate, with only a trace of hyaluronate; in the cirrhotic liver, the heparan sulfate and dermatan sulfate fractions were increased 5-fold and 4-fold, resp., and the hyaluronate concentration was increased to abou 20% of the total. No chondroitin-4-sulfate or chondroitin-6-sulfate could be found in either liver. It is concluded that the appearance of mature collagen fibrils in the liver mesenchyme during cirrhosis cannot be ascribed to a qualitative change in the type of acidic glycosaminoglycans. A chromatographic method for the isolation and determination of the glycosaminoglycans is described in detail.

4602 GASTRIC IRON BINDING IN HEMOCHROMATOSIS, SECONDARY IRON OVERLOAD, CIRRHOSIS, AND DIABETES. *(E.)* Luke, C. G. (Dept. Med. U. Adelaide, Australia), P. S. Davis and D. J. Deller. *Lancet* 2(7573):844-846, 1968.

The iron-binding ability of gastric juice in 50 controls, 12 patients with hemochromatosis, 6 patients with iron overload due to other causes, 20 patients with cirrhosis of the liver, and 20 patients with diabetes mellitus was studied. Gastric juice was collected after a 12 hr fast. Chelating ability was determined by a radio-iron solubility test. In the controls, iron-binding ability ranged from 0.04 to 0.24 mg of ferric iron/ml gastric juice (mean = 0.71 mg/ml). In the patients with hemochromatosis, values ranged from 0.004 to 0.008 mg/ml. In the patients with iron overload, values ranged from 0.126 to 0.248 mg/ml (mean = 0.176 mg/ml). In the cirrhotic and diabetic patients, values were within the normal range. The absence of iron-binding ability appears to be peculiar to idiopathic hemochromatosis and may account for the excessive absorption of dietary iron.

4603 LYMPH PROTEIN IN HEPATIC CIRRHOSIS AND EXPERIMENTAL HEPATIC AND PORTAL VENOUS HYPERTENSION. *(E.)* Witte, C. L. (Washington U. Sch. Med., St. Louis, Mo.), M. H. Witte, A. E. Dumont, J. Frist and W. R. Cole. *Ann Surg* 168(4):567-577, 1968.

To determine the relative influence of pre- and postsinusoidal obstruction on the production of thoracic duct lymph and ascites fluid in hepatic cirrhosis, the protein content of the thoracic duct lymph, liver lymph, intestinal lymph, ascites fluid and plasma were measured in various combinations in 68 patients with cirrhosis, including 10 after portacaval shunt. The results were compared with findings in 13 control subjects and in 21 healthy mongrel dogs with experimentally produced hepatic or portal venous hypertension. Liver lymph can be distinguished from extrahepatic portal bed lymph by its uniquely high protein content. Experimental posthepatic venous obstruction increased formation of liver lymph and thoracic duct lymph high in protein. This high protein liver lymph 'wept' into the peritoneal cavity, initiating ascites. Portal vein obstruction lowered the protein concentration in intestinal and thoracic duct lymph. In patients with hepatic cirrhosis having early stages of the disease, where increased postsinusoidal resistance predominates, excess liver lymph formed the main part of thoracic duct lymph. Ascites fluid was derived mainly from liver lymph at this stage. With progression of the disease where presinusoidal resistance increases, transhepatic portal blood flow decreases and bleeding esophageal varices occur. The main portion of thoracic duct lymph in this stage is formed by excess low-protein intestinal capillary filtrate, and ascites fluid is derived mainly from the bowel and the mesentery. After portacaval shunting, thoracic duct lymph decreases and the protein concentration rises due to a greater proportion of liver lymph contributing to thoracic duct lymph.

4604 **CARBOHYDRATE METABOLISM STUDIES IN CIRRHOSIS OF THE LIVER.** *(E.)* Carneiro de Moura, M. (U. Hosp. Santa Maria, Lisbon Med. Sch., Portugal) and A. Ginestal Cruz. *Amer J Dig Dis* 13(10): 891-906, 1968.

Oral glucose tolerance tests, i.v. tolbutamide tests, and glucagon tests were performed in 30 patients with hepatic cirrhosis to determine alterations in carbohydrate metabolism in this condition. High fasting blood glucose levels were found in only 2 patients, but 21 patients had diabetic glucose tolerance curves. Only 7 of these patients had a diabetic response after tolbutamide. In the remaining patients, the most striking abnormality was a delayed maximal fall in glucose with a slow return to pretest levels. In 14 patients the hypoglycemia unresponsiveness was pronounced. Nine patients had normal tolbutamide tests. An abnormally low response to glucagon was noted in 20 patients. No correlation was noted between the glucagon response and the hypoglycemia unresponsiveness after tolbutamide. No significant difference was noted in mean glucose levels during the tolerance tests between cirrhotics with and without azotemia. Seven of the patients with abnormal creatine levels showed diabetic responses in the glucose and tolbutamide tolerance tests. The results indicate the usefulness of the tolbutamide test for the diagnosis of diabetes in association with cirrhosis. Chronic hepatic disease may produce endogenous insulin resistance and hyperinsulinemia before glucose tolerance is impaired with the development of diabetes when β-cell decompensation occurs.

4605 **TREATMENT OF CHRONIC HEPATIC ENCEPHALOPATHY WITH LACTULOSE.** *(E.)* Fung, W. P. (Dept. Clin. Med., U. Singapore) and O. T. Khoo. *Med J Aust* 2(4):160-163, 1968.

Two case histories are presented of patients (men, 48 and 55 yr) with chronic alcoholism, cirrhosis and chronic hepatic encephalopathy that had been treated unsuccessfully with neomycin (1 g/6 hr), colonic washouts and protein-free diets consisting of glucose drinks. Each patient had a persistent flapping tremor and, upon readmission to the hospital in a state of hepatic precoma or first-degree coma, was given lactulose (30 ml 3 times daily) and maintained on a protein diet (70-80 g/day). Neomycin and colonic washouts were not continued. After 4-6 days of therapy, the condition of each had markedly improved, orientation was good, there was no constructional apraxia and the flapping tremor had disappeared. Continuous lactulose therapy was necessary after discharge to prevent recurrence of the disorders. Lactulose is a synthetic disaccharide which is not hydrolyzed by human intestinal disaccharidases. It passes into the colon where it is split by bacteria into organic acids (mainly lactic and acetic) which produce a fermentative diarrhea by their osmotic effect in the bowel lumen, and lower the stool pH. This leads to a decrease in the putrefaction of proteins by altering the bacterial flora in the gut. The ammonia and other nitrogenous compounds thought to be responsible for encephalopathy are thus reduced.

4606 **A SEVEN-YEAR EXPERIENCE WITH SIDE-TO-SIDE PORTACAVAL SHUNT FOR CIRRHOTIC ASCITES.** *(E.)* Burchell, A. R. (St. Vincent's Hosp., New York City), L. M. Rousselot and W. F. Panke. *Ann Surg* 168(4):655-670, 1968.

An analysis is made of 63 cases (32 men and 31 women, 31-76 yr old) of cirrhotic ascites treated by elective side-to-side portacaval shunt during a 7-yr period. Of the 63 patients, 37 had experienced variceal hemorrhage, 51 were alcoholics and 12 had had acute infectious hepatitis. The presence of portal hypertension and the volume of the liver were determined by arteriography, splenoportography, hepatography and hepatic scintigraphy. Five patients were considered good risks for the operation, 22 fair and 36 were poor risks as indicated by liver function tests, presence of ascites and the degree of tissue wasting. Mean portal pressure averaged 387 mm H_2O prior to shunting and 202 mm H_2O following the anastomosis. Preshunt portal flow averaged 373 ml/min (range, 0-905 ml/min) and postshunt flow averaged 752 ml/min in the splanchnic limb of the portal vein. Hepatic arterial pressure did not differ significantly before or after shunting. Preshunt arterial flow averaged 389 ml/min compared to 802 ml/min after shunting. Overall operative mortality was 12% (cardiac-hepatic-renal failure caused 3 of the deaths). Late mortality (after hospital discharge) occurred in 21 patients, the most common cause (12 cases) being hepatic failure due to progressive liver disease. The most significant undesirable side effects were encephalopathy (18 cases) and congestive heart failure (22 cases), neither of which occurred with such severity as to render the procedure unacceptable. Other postoperative complications were recurrent ascites (7 cases), gastrointestinal bleeding (7, nonvariceal), umbilical hernia, breast cancer (3 cases), diabetes (4) and polyarthralgia (25%). Amelioration of resistant ascites and prevention of variceal hemorrhage was achieved in more than 90% of the cases. Similar protection from ascites was not achieved by end-to-side shunts in a comparative study of a 16-yr experience with 210 elective end-to-side shunts for variceal hemorrhage. The long-term survival rate was about 60% from the third to seventh year of follow-up. This was more than twice as good as the survival rate for the end-to-side group, which had a large group of good risk patients.

4607 PLASMA AMINO ACIDS IN PREPSYCHOTIC ALCOHOLICS. *(E.)* Frederiksen, P. (Alcohol Clin., U. Göteborg, Sweden) and R. Jagenburg. *Acta Med Scand* 183(1-2):139-142, 1968.

The plasma levels of individual amino acids, amino-nitrogen and ammonia were determined in 30 advanced alcoholic patients. Treatment of all patients included large doses of sedatives with injections of thiamine, lactoflavine, nicotinamide, pyridoxine chloride and pantothenic acid; they were on an ordinary diet. Mean plasma amino-nitrogen was unchanged during the period of observation (6 days) and was similar to that in 4 healthy subjects. Determinations of individual amino acids showed low fasting levels of taurine and high glutamic acid levels (especially during the first 3 days) in all patients; other amino acid levels were essentially normal in all patients, even in those who developed delirium. Occasionally, high threonine and serine levels were observed. The plasma ammonia level was normal. Previously reported reductions of plasma amino acid levels could not be confirmed. It is concluded that elevated plasma glutamic acid might reflect a disturbed α-ketoglutaric acid-glutamic acid-glutamine balance, which might imply a reduced supply of α-ketoglutaric acid in the brain resulting in a lowered cerebral respiration.

4608 THE EFFECT OF GLUCOSE INFUSION ON AMMONIA METABOLISM IN LIVER FAILURE. *(E.)* Sy, B. G. (Cook County Hosp., Chicago, Ill.), G. Dunea, F. Steigmann and A. Dubin. *Amer J Med Sci* 256:91-96, 1968.

The effect of glucose infusions (25-50 g i.v.) on blood ammonia levels was studied in 24 patients (18 men and 6 women, average 48 yr old) with decompensated liver disease and portal hypertension. Most patients received 25 g of glucose by rapid i.v. infusion. Insulin was administered with the glucose in 5 patients. Serial blood samples were collected at 0, 30, 60, 120 and 180 min for glucose and ammonia determinations. No significant changes in blood ammonia levels were observed following infusion of glucose alone or glucose plus insulin.

4609 CIRRHOSIS: WHAT IS IT? *(E.)* Caravati, C. M. (Dept. Med. Coll. Virginia, Richmond). *Med Coll Virginia Quar* 4(1):10-17, 1968.

4610 HEPATOCARCINOMA ASSOCIATED WITH BILIARY CIRRHOSIS: A CASE DUE TO CONGENITAL BILE DUCT ATRESIA. *(E.)* Deoras, M. P. (Milwaukee County Gen. Hosp., Wisc.) and W. Dicus. *Arch Path* 86(3):338-341, 1968.

4611 DETERMINATION OF HEPATIC BLOOD FLOW AND THE STATE OF THE RETICULOENDOTHELIAL SYSTEM IN CIRRHOTIC PATIENTS BY MEANS OF RADIOACTIVE COLLOIDAL GOLD. *(Rus.)* Frenkel', V. Kh. (Kishinev Med. Inst., USSR) and V. D. Pavliuk. *Sovet Med* (7):119-122, 1968.

4612 RENAL INSUFFICIENCY IN DECOMPENSATED CIRRHOSIS OF THE LIVER: FIVE CASES AND A REVIEW OF THE PATHOPHYSIOLOGY. *(Dan.)* Thomsen, A. C. (Bispebjerg Hosp., Copenhagen, Denmark). *Ugeskr Laeg* 130(14):585-591, 1968.

4613 LIVER CIRRHOSIS ACCOMPANIED BY DUODENAL ULCERS. *(Pol.)* Czyzewski, K. (1st Surg. Clin., Acad. Med. Wroclaw, Poland), M. Chrzanowska and L. Oleszkiewicz. *Pol Tyg Lek* 23(35):1314-1316, 1968.

4614 BLOOD COAGULATION DISTURBANCES DUE TO CIRRHOSIS OF THE LIVER. *(Hun.)* Sas, G., and J. Jako. *Orv Hetil* 109(28):1519-1523, 1968.

4615 PRIMARY BILIARY CIRRHOSIS. *(E.)* Wessler, S. (Jewish Hosp., St. Louis, Mo.) and L. A. Avioli. *JAMA* 206(6):1285-1288, 1968.

4616 CIRRHOSIS OF THE LIVER. *(E.)* Read, A. E. (United Bristol Hosp., England). *Brit Med J* 1(5589):427-430, 1968.

4617 CESSATION OF GOUT FOLLOWING PORTACAVAL SHUNT. *(E.)* Lefkovits, A. M. (1030 Jefferson Ave., Memphis, Tenn.), J. T. Herman and C. C. Irving. *JAMA* 205(4):213-214, 1968.

4618 THE PROGNOSIS OF ACTIVE HEPATIC CIRRHOSIS WITH PARTICULAR ATTENTION TO ITS TREATMENT WITH GLUCOCORTICOIDS. *(Ger.)* Mühler, E. (Munic. Hosp., Saarbrücken, Germany), K. Zwirner and H. Gros. *Med Klin* 62(48):1869-1873, 1967.

4619 CORTISOL METABOLISM IN CIRRHOSIS. *(E.)* Zumoff, B. (Montefiore Hosp. Med. Ctr., New York City), H. L. Bradlow, T. F. Gallagher and L. Hellman. *J Clin Invest* 46(11):1735-1743, 1967.

4620 PATHOGENESIS OF HEPATIC ENCEPHALOPATHY. *(E.)* Vlahcevic, Z. R. (VA Hosp., Richmond, Va.). *Med Coll Virginia Quar* 4(1):32-37, 1968.

4621 INVESTIGATION OF PORTAL HYPERTENSION. *(E.)* Losowsky, M. S. (U. Leeds, England). *Postgrad Med J* 44(514):657-659, 1968.

4622 THE PATHOGENESIS AND MEDICAL TREATMENT OF HEPATIC ENCEPHALOPATHY. *(E.)* Read, A. E. (U. Bristol, England). *Postgrad Med J* 44(514):652-656, 1968.

4623 THE USE OF RENO-PORTAL ANASTOMOSIS IN THE TREATMENT OF PORTAL HYPERTENSION: AN EXPERIMENTAL STUDY. *(E.)* Parkinson, S. W. (Royal Perth Hosp., Melbourne, Australia) and M. B. Summers. *Aust New Zeal J Surg* 38(1):70-73, 1968.

See also abstract nos.: 3903,4517,4529

4624 **THE INCIDENCE OF CONGENITAL BILIARY ATRESIA.** *(Ger.)* Tunte, W. (Inst. Human Genet., Wilhelms U. Westphalia, Muenster, Germany). *Z Kinderheilk* 102(4):275-188, 1968.

A detailed analysis of the 30 cases of congenital biliary atresia encountered in Muenster and environs in the period 1950-61 indicated that this congenital anomaly is probably exogenous rather than genetic in origin. The 30 cases (19 males and 11 females) represented an incidence of 0.61/10,000 live births (0.75 for males and 0.46 for females), with an increased incidence among higher birth orders (0.14/10,000 among the first-born compared to 1.29 among 3rd or later children) but no correlation with parental age. There was little variation from year to year (0-5 cases/yr), but more cases were born during the fall and winter (20) than during the spring and summer (10). The incidence was also somewhat higher in the rural areas than in the city.

4625 **STRATIFICATION OF BILE IN THE NORMAL GALLBLADDER DURING INTRAVENOUS CHOLANGIOGRAPHY.** *(E.)* Newman, H. (Good Samaritan Hosp., Phoenix, Ariz.), T. Ditchek and R. Mason. *Amer J Dig Dis* 13(9):779-782, 1968.

Stratification in the gallbladder with a radiolucent zone of nonopacified bile may be a physiological phenomenon during i.v. cholangiography. This finding should not be confused with floating cholesterol gravel or sludge. A post-fatty-meal and/or delayed films may aid in the differentiation of these 2 conditions. The stratification phenomenon may be avoided if a fatty meal is given 1 hr prior to the X-ray study.

4626 **CONTRIBUTION TO THE STUDY OF THE INNERVATION OF THE GALLBLADDER.** *(Por.)* De Mello, J. B. (Fac. Med., U. São Paulo, Brazil) and A. Garrido Jr. *Rev Paul Med* 72(4):163-168, 1968.

Autopsy specimens obtained from 60 adult Brazilians (30 males and 30 females) were dissected in order to study the variation in the number and distribution of nerve fibers leading from the anterior and posterior hepatic plexi to the gallbladder and biliary tract. Nerve fibers originating primarily in the left celiac ganglion were found to follow the common hepatic artery and form the so-called "anterior" or "inferior" hepatic plexus at the point where the hepatic artery reaches the hepatic pedicle. From the outer edge of this plexus, near the bifurcation of the hepatic artery, one or more small fibers (less than 0.1 mm in diameter) proceed cranially and laterally across the anterior face of the bile duct, forming the "medial" or "internal" nerve of the gallbladder. This nerve consisted of a single fiber in 35 cases, 2 fibers in 23, 3 fibers in 1, and multiple fibers in 1. The delicate fibers which accompany the right branch of the hepatic artery remain intimately associated with the hepatic ducts and innervate the posterior face of the gallbladder neck. From the right celiac ganglion, 2-5 nerve fibers emerge to form the "posterior hepatic plexus" and innervate the cranial, intermediate and caudal segments of the common bile duct. The intermediate group of nerve fibers, however, also sends ascending and descending branches to innervate the other two segments of the common bile duct. The ascending branch gives rise to one or more small fibers which innervate the lateral face of the cystic duct and gallbladder and are referred to as the "external" or "lateral" nerve of the gallbladder. This nerve consisted of a single fiber in 38 cases, 2 fibers in 13, 3 fibers in 3, and multiple fibers in 6. In 14 cases, the posterior nerve of the common bile duct also gave rise to a fiber which innervated the cystic duct.

4627 **BACTERIOLOGY AND ANTIBIOTIC SELECTION IN BILIARY TRACT SURGERY.** *(E.)* Mason, G. R. (Stanford U. Sch. Med., Palo Alto, Calif.). *Arch Surg* 97(4):533-537, 1968.

In a series of 110 consecutive biliary tract operations, the clinical status, patient age, bacterial culture, and antibiotic sensitivity were studied. Bile cultures from 90 patients showed bacterial growth in 43 cases; 22 of those were mixed infections. The most common microorganisms were *E. coli, Staphylococci, Clostridia, Streptococci,* and *Klebsiella.* Of 13 wound infection patients in whom bile cultures were done, 10 were positive. Positive cultures were also noted in more than 50% of patients over age 50. Common duct stones were associated with microbial pathogens in 70% of cases. Patients with repeated acute attacks of cholecystitis showed 55% positive cultures. The incidence of operative wound infections was markedly increased among patients with common duct stones (21% following common duct exploration) and acute or chronic cholecystitis (30%). The wound infections all occurred in patients untreated with systemic antibiotics. On the basis of bacterial sensitivity tests, it was recommended that prophylactic antibiotic therapy consisting of penicillin and chloramphenicol or tetracycline be administered to patients with acute cholecystitis, "subacute" cholecystitis, obstructive jaundice, biliary stasis, clinically-suspected active sepsis, and to patients aged 60 and older.

4628 **PROGNOSIS OF EARLY POST-CHOLECYSTECTOMY DISTRESS. ANALYSIS OF 593 PATIENTS CHOLECYSTECTOMIZED FOR GALLSTONE DISEASE.** *(E.)* Domellof, L. (Dept. Surg., Centrallasarettet, Lidkoping, Sweden) and T. Schersten. *Acta Chir Scand* 134: 291-295, 1968.

Of 593 patients cholecystectomized for gallstone disease, the frequency of postoperative distress (dyspepsia, biliary colic) was identical 2 and 5 yr after operation. The incidence of post-cholecystectomy distress was considerably lower in patients with preoperative hyperdiastasuria (15%). The incidence ranged from 28% to 40% in the remaining patients, with the lowest incidence in the choledocholithiasis patients. Of patients complaining of distress at 2-yr follow-up, 35% were free of symptoms at 5-yr follow-up. Of these patients, 73.5% of the patients found their distress to be more or less palliated by the 5-yr follow-up. This study suggests that the prognosis of early post-cholecystectomy distress is fairly favorable. However, because some distress had a late (>2 yr) onset, the total frequency was found to be practically the same 2 and 5 yr after operation.

4629 **EFFECT OF CHOLESTYRAMINE ON CHOLESTEROL GALLSTONES IN MICE.** *(E.)*

Bergman, F. (Dept. Path. I, U. Umea, Sweden) and W. van der Linden. *Acta Chir Scand* 134:287-290, 1968.

Mice fed a cholesterol-cholic acid diet were found on exploratory laparotomy to have cholesterol gallstones. When fed the same diet without cholic acid, some mice evidenced dissolution of the gallstones. The addition of 3% cholestyramine to the diet did not affect the dissolution of the gallstones. Cholestyramine also had no effect on the dissolution of gallstones in mice fed normal laboratory chow. It was found that esterified cholesterol, which accumulates in the liver of mice fed a gallstone-inducing diet, disappeared more quickly in mice fed a diet containing both cholesterol and cholestyramine than in mice fed the same diet without the cholestyramine.

4630 VARIATIONS IN THE ULTRACENTRIFUGAL CHARACTERISTICS OF HUMAN GALLBLADDER AND HEPATIC BILE WITH DISEASES OF THE BILIARY TREE.

(E.) Kodsi, B. El (Boston U. Sch. Med., Mass.), S. R. Cooperband and I. A. D. Bouchier. *J Lab Clin Med* 72(4): 592-601, 1968.

Analytical ultracentrifugation was employed to examine 49 bile samples taken from normal and diseased gallbladders and common bile ducts. A single main peak of macromolecular material (sedimentation coefficient =2) was found in all hepatic and gallbladder bile samples from patients with normal liver function. The sedimentation coefficient correlated with bile concentration. The peak appeared to be associated with bile pigment. Hepatic and gallbladder bile from patients with biochemical evidence of liver disease had a faster sedimentation peak (sedimentation coefficient = 4). The main macromolecular sediment accounted for 77% of the total solids in normal gallbladder bile, but constituted a significantly lower percentage of total solids in hepatic and gallbladder bile samples from patients with stones: in dilute bile samples from normal gallbladders and those containing stones but able to concentrate, the percentage of total solids sedimenting as main macromolecules was relatively less than could be expected from dilution alone.

4631 STUDIES OF AUTOGENOUS VEIN AS A REPLACEMENT FOR THE COMMON BILE DUCT.

(E.) Aschberg, S. (Vanderbilt U. Sch. Med., Nashville, Tenn.), A. Manlove, J. H. Foster and P. Russell. *Surg Gynec Obstet* 127(5):1033-1041, 1968.

The use of autogenous vein as a replacement for the common bile duct was studied in mongrel dogs. In 10 dogs, the resected external jugular vein was embedded between the submucosa and muscularis of the duodenum to determine the time necessary for vascularization of the vein segment. Good vascularization was attained by the 13th day after implantation. In 12 dogs, a 2-stage procedure was performed, consisting of implanting the excised jugular vein segment into the duodenum as described, followed in 13-22 days by anastomosis of the proximal vein segment to the proximal part of the divided common duct. In 10 of the 12 dogs, average survival was 19 days, with death mainly attributable to peritonitis secondary to anastomotic leaks and vein stricture. The hepatic ducts were found to be markedly dilated with obliteration of the vein graft in the 2 survivors. In 20 dogs, a 1-stage procedure was performed consisting of excision of the jugular vein, anastomosis of the superior portion of the vein segment to the divided common duct, and tunneling the inferior portion of the vein into the duodenal lumen. Varying degrees of dilatation of the intrahepatic biliary tree were noted from 30 to 146 days postoperatively. The vein grafts showed signs of necrosis in the short-term survivors and were regularly replaced by scar tissue in long-term survivors. All grades of biliary cirrhosis were present.

4632 AUTOPSY OBSERVATIONS IN A SERIES OF CHOLECYSTECTOMIES.

(E.) Silvennoinen, E. (Central Hosp., U. Helsinki, Finland), V. Makela and K. Asp. *Acta Chir Scand* 134(2):131-134, 1968.

A series of 38 cases (8 men and 30 women, 46-86 yr old) is presented in which the post-cholecystectomy (6 days to 31 yr) condition of the bile ducts was examined at autopsy. The findings were as follows: 3 cases with common duct stones, 4 cases with stones in cystic duct stumps, 20 cases with cystic duct remnants (5 mm or longer), 7 cases with neuromata, one case with a gallstone around a silk suture, and 2 cases with primary carcinoma of the bile ducts. The aim of this paper was to point out that, even after cholecystectomy performed in the normal way, a large number of pathological features may be present which might contribute to the so-called postcholecystectomy syndrome. The findings support the existence of this syndrome and show how it should be prevented or, if necessary, corrected by surgery.

4633 ACUTE MANGANESE OVERLOAD: A NEW EXPERIMENTAL MODEL OF INTRAHEPATIC CHOLESTASIS.

(E.) Witzleben, C. L. (St. Louis U. Med. Sch., Missouri), P. Pitlick, J. Bergmeyer and R. Benoit. *Amer J Path* 53(3):409-423, 1968.

Hepatocellular abnormalities leading to hepatic necrosis were observed in liver specimens from 26 male Sprague-Dawley rats (200-400 g) given 10% or 20% manganese sulfate (0.1 ml/100 g of body weight) i.v., and sacrificed 6, 12, and 20 hr after injection; 10 rats were used as controls and were sacrificed at the same intervals. Bilirubin clearance was measured in 10 controls and 11 test animals given 20% manganese sulfate and infused with a solution containing 0.2 g of unconjugated bilirubin, 0.52 g of NaCl and 0.25 g of $NaHCO_3$ per 100 ml; the solution was infused at a rate of 0.66 mg of bilirubin per min. The bile duct was cannulated and bile specimens were collected at 5-min intervals. Marked mitochondrial swelling and lipid accumulation were observed by light microscopy; electron microscopy studies revealed widespread alterations in hepatocyte bile transport and secretory apparatus with increased prominence and dilatation of the Golgi apparatus and dilatation of the bile canaliculi, with loss of microvilli and swelling. Bile duct ultrastructure was normal. Bilirubin clearance studies revealed the presence of severe cholestasis. Manganese overloading appears to be an effective means of studying the mechanisms of intrahepatic cholestasis.

4634 EPIDEMIOLOGICAL STUDY OF CHOLELITHIASIS AMONG RAILROAD WORKERS IN INDIA WITH SPECIAL REFERENCE TO CAUSATION.

(E.) Malhotra, S. L. (Med. Dept., Western Railway, Bombay, India). *Gut* 9(3):290-295, 1968.

A study was made of the incidence of cholelithiasis in a population of 1.31 million Indian railroad workers and their families (total population 2.6 million) between the ages of 18 and 55 years. While the disease was found to have an incidence rate of 18 per 100,000 in the 5-yr period 1960-64 (total of 468 confirmed cases), there were marked geographic differences, with the disease being 7 times more common in the north than in the south. The mean age at diagnosis was 38 yr among north Indians and 43 yr among south Indians. The incidence among females was also found to be greater in the north than in the south. An inverse relation was noted between the incidence of cholelithiasis and that of peptic ulcer. It is concluded that the geographic differences in the incidence rates of the disease and the varying male-female ratio may be due to differences in dietary factors, and that the pattern of diet and eating may be implicated in the pathogenesis of gallstones by its influence on gallbladder stasis.

4635 QUANTITATIVE MICROANALYSIS OF GALLSTONES. *(E.)* Nakayama, F. (Kyushu U. Fac. Med., Fukuoka, Japan). *J Lab Clin Med* 72(4):602-611, 1968.

A relatively simple, quantitative, microanalytical technique was used in the analysis of the composition of 10 randomly chosen gallstones. This method is based on preliminary separation of gallstone constituents into subgroups with solvent partition and silica-gel column chromatography followed by gas chromatography. As little as 35 mg of sample is needed to give information on gallstone constituents including cholesterol and its esters, mono-, di-, and triglycerides, free fatty acids, phospholipids, bile acids, calcium, sodium, potassium, and phosphorus. Cholesterol esters were present mostly in minute amounts, while cholesterol comprised 11% to 98% of the constituents. Free fatty acids were present in varying amounts. Phospholipids were the most minor components. Bile acids in the form of cholic, chenodeoxycholic, deoxycholic, and lithocholic acids were present only in minute amounts. The proportion of chenodeoxycholic acid in human gallstones was greater and that of cholic acid was smaller than the corresponding proportions in human gallbladder bile. No glycerides were detected.

4636 THE CONNEXION BETWEEN MYOCARDIAL INFARCTION AND GALLSTONES IN AN AUTOPSY SERIES. *(E.)* Bergman, F. (University Dept. Pathol., Gen. Hosp., Malmo, Sweden), W. van der Linden and J. Soderstrom. *Acta Path Microbiol Scand* 73(4):559-564, 1968.

4637 ACUTE GANGRENOUS ACALCULOUS CHOLECYSTITIS IN INFANCY: REPORT OF A CASE. *(E.)* Lucas, C. E. (Wayne State U. Sch. Med., Detroit, Mich.) and A. J. Walt. *Surgery* 64(4):847-849, 1968.

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GASTROENTEROLOGY

ABSTRACTS AND CITATIONS

NATIONAL INSTITUTE OF ARTHRITIS AND METABOLIC DISEASES

U.S. DEPARTMENT OF
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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available, free to qualified interested investigators and practitioners, citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology has accompanying abstracts.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans
Ar.	Arabic
Bul.	Bulgarian
Ch.	Chinese
Cz.	Czech
Dan.	Danish
Dut.	Dutch
E.	English
Eston.	Estonian
Fin.	Finnish
Fl.	Flemish
Fr.	French
Ger.	German
Gr.	Greek
Heb.	Hebrew
Hun.	Hungarian
Ic.	Icelandic
In.	Indonesian
It.	Italian
Jap.	Japanese
Kor.	Korean
Latv.	Latvian
Lith.	Lithuanian
Nor.	Norwegian
Pol.	Polish
Por.	Portuguese
Rum.	Rumanian
Rus.	Russian
Ser.	Serbo-Croatian
Sl.	Slovak
Sp.	Spanish
Sw.	Swedish
Th.	Thai
Turk.	Turkish
Uk.	Ukrainian
Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
ATP	adenosine triphosphate
BSP	sulfobromophthalein
C	degrees centigrade
cm	centimeter(s)
CNS	central nervous system
cpm	counts per minute
DNA	deoxyribonucleic acid
e.g.	for example
g	gram(s)
μg	microgram(s)
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kg	kilogram(s)
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar
mEq	milliequivalent(s)
mM	millimolar
μM	micromolar
mC, μC	milli-, microcurie(s)
mg	milligram(s)
min	minute(s)
ml	milliliter(s)
mm	millimeter(s)
MTD	maximum tolerated dose
ng	nanogram (10^{-9})
pg	picogram (10^{-12})
p.o.	orally
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
Rev.	review (only in citations)
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

GENERAL

4669 PRESERVATION OF EXOCRINE PANCREATIC FUNCTION IN THE MAGNESIUM-DEFICIENT RAT. *(E.)* Sarner, M. (Harvard Med. Sch., Boston, Mass.) and P. J. Snodgrass. *J Nutr* 96(2):275-280, 1968.

Pancreatic exocrine function was studied in young and adult rats which had been fed a magnesium-deficient diet, compared with that in pair-fed, magnesium-supplemented controls and young rats fed a commercial laboratory ration on an *ad libitum* basis. No differences were demonstrated between the test or control animals with respect to volume, amylase or nitrogen output, either in the resting state or after maximal stimulation with secretin and pancreozymin. Severe magnesium deficiency in young rats produced no depression in the magnesium content of the pancreas, although depletion of serum, red cells, bone, heart and skeletal muscle magnesium was achieved. Chronic dietary deficiency of magnesium in adult rats was not associated with depletion of pancreatic magnesium. The young animals showed the neuromuscular and cardiovascular complications of magnesium deficiency at a time when there was no decrease in pancreatic magnesium. It is concluded that magnesium deficiency alone is unlikely to play a role in the depression of pancreatic function seen in the hypomagnesemic states which may accompany malnutrition.

4670 INHIBITION OF THE TRANSPORT OF d-TUBOCURARINE FROM THE BLOOD TO BILE BY k-STROPHANTOSIDE IN THE ISOLATED PERFUSED RAT LIVER. *(E.)* Meyer, D. K. F. (Dept. Pharm., U. Groningen, Netherlands) and A. H. J. Scaf. *Europ J Pharmacol* 4(3):343-347, 1968.

The biliary excretion of d-tubocurarine was studied in experiments with the isolated perfused rat liver preparation. A blank sample was taken followed by injection of d-tubocurarine or k-strophanthoside 1 hr after connecting the liver to the perfusion system. Samples of 7.5 ml of blood were withdrawn at intervals for chemical analysis and bile samples were collected. d-Tubocurarine was extracted from serum and bile with ethylene dichloride at alkaline pH, and was determined fluorimetrically as the dye-curare complex with Rose-Bengal. Thin-layer chromatography was used to identify the excreted compounds. Of the administered dose of d-tubocurarine (300-350 μg), 31-44% was excreted unchanged during perfusions of 2 hr. The compound moved from blood to bile against a large concentration gradient, with bile-to-blood concentration ratios of 94-190/1. The transport of d-tubocurarine to bile was shown to be blocked by k-strophanthoside in a concentration of 2×10^{-5} M. The strophanthoside did not affect the volume of bile produced by the liver. It is suggested that a Na^+-K^+ activated ATPase may be involved in the transport of d-tubocurarine to bile.

4671 THE NORMAL MICROBIAL FLORA AS A MAJOR STIMULUS FOR PROLIFERATION OF PLASMA CELLS SYNTHESIZING IgA IN THE GUT: THE GERM-FREE INTESTINAL TRACT. *(E.)* Crabbé, P. A. (Res. Dept. Int. Path., St. Pierre U. Clin., Louvain, Belgium), H. Bazin, H. Eyssen and J. F. Heremans. *Int Arch Allergy* 34(4):362-375, 1968.

Immunohistochemical investigations carried out on the intestinal mucosa of adult mice of the C3H strain showed such structures to be very rich in plasma cells synthesizing IgA. In contrast, in the intestine of germ-free mice, the IgA-cell populations were reduced to one-tenth or less of the normal values. Similarly, the concentrations of IgA in the serum, intestinal secretions and intestinal mucosal homogenates of germ-free animals were very low and did not exceed 10% of the control values. Such observations strongly suggest a direct causal relationship between the presence in the intestinal lumen of a living microbial flora and the development of cells synthesizing IgA in the digestive mucosa.

4672 ACCUMULATION OF ENDOGENOUS PROTEIN IN THE CECUM OF THE GERMFREE RAT. *(E.)* Loesche, W. J. (Forsyth Dental Ctr., Boston, Mass.). *Proc Soc Exp Biol Med* 129(2):380-384, 1968.

Germfree CDF rats were placed on diets containing either 0% or 10% casein for 8 days to obtain information concerning the origin of the soluble protein which accumulates in the enlarged cecum of germfree rodents. The results demonstrated that considerable amounts of protein and insoluble nitrogen-containing compounds are found in the cecal contents of rats after 8 days on a low-protein or even protein-free diet. This implies that most of the protein found in the cecal contents was derived from the host and not from the diet. Additional experiments showed that conventional animals reabsorb 80-90% of the nitrogen-containing compounds found in the contents of the distal half of the small intestine, whereas these compounds are not reabsorbed in germfree animals. It thus appears that the germfree rat cannot efficiently degrade and reabsorb the endogenous proteins which are shed into his gastrointestinal tract.

4673 EFFECTS OF A SINGLE ORAL LOAD OF MEDIUM-CHAIN TRIGLYCERIDE ON SERUM LIPID AND INSULIN LEVELS IN MAN. *(E.)* Tamir, I. (Inst. Child Health, U. London, England), D. B. Grant, A. S. Fosbrooke, M. M. Segall and J. K. Lloyd. *J Lipid Res* 9(5):661-666, 1968.

In 4 volunteers, analysis of serum free fatty acids by gas-liquid chromatography showed high proportions (27-57%) of octanoic acid for up to 4 hr after the ingestion of a single oral load of medium-chain triglyceride (approximately 1 g/kg body weight). The effects of a medium-chain triglyceride load on the concentrations of plasma free long-chain fatty acids, plasma glucose, serum insulin, and serum triglyceride were then observed and compared with the effects of a glucose load. A rapid fall in the free long-chain fatty acids followed both types of load but only a small rise in serum insulin was observed after medium-chain triglyceride. The fall in the free long-chain fatty acids following ingestion of medium-chain triglyceride cannot, therefore, be caused mainly by the release of insulin and may be due to a direct action on adipose tissue. No medium-chain fatty acids were detected in the serum triglyceride after ingestion of medium-chain triglyceride, but there was a small but significant increase in the percentage of hexadecenoic acid in this fraction.

4674 **POTENTIAL RESPONSES OF NUTRIENT MEMBRANE OF FROG'S STOMACH TO STEP CHANGES IN EXTERNAL K^+ AND Cl^- CONCENTRATIONS.** *(E.)* Spangler, S. G. (U. Alabama Med. Ctr., Birmingham) and W. S. Rehm. *Biophys J* 8(11):1211-1227, 1968.

An *in vitro* chamber method was used to determine the relative ionic conductances of the nutrient membrane of frog gastric mucosa. The concentration of a given ion in the nutrient bathing solution was changed, and the ensuing time course of the change in transmucosal potential difference was recorded. Increasing $[K^+]$ from 4 to 79 mM produced a response in potential difference which occurred markedly faster than the response to the reverse change; similar results were obtained on changing the Cl^- concentration. It was found that these differences could be predicted by the analysis of an idealized model consisting of a membrane in series with a diffusion barrier. When both the $[K^+]$ and the $[Cl^-]$ were changed, such that the product of their concentrations remained constant, the time courses of the responses were again similar to those predicted on the basis of the model. From the magnitudes of the total potential-difference responses it is shown that, in the presence of a 4 mM K^+ nutrient solution, the conductivity of the nutrient membrane appears to be entirely due to the K^+ and Cl^- conductances, the K^+ conductance being about twice that of the Cl^-. It is also shown that with a 79 mM K^+ nutrient solution the parameters of the membrane are changed such that the conductances of the two ions are approximately equal. The time constant for diffusion of KCl or NaCl across the barrier consisting of the submucosa, muscularis mucosa and lamina propria is about 1 min.

4675 **BILIARY IRON EXCRETION IN NORMAL AND IRON-LOADED RATS AFTER DESFERRIOXAMINE AND CaDTPA.** *(E.)* Figueroa, W. G. (UCLA Sch. Med., Los Angeles, Calif.) and J. H. Thompson. *Amer J Physiol* 215(4):807-810, 1968.

Acute biliary and pancreatic iron excretion was studied in 58 normal and iron-loaded male Sprague-Dawley rats before and after a single s.c. injection of desferrioxamine B (DFB) or calcium diethylenetriaminepentaacetic acid (CaDTPA). The rats were maintained on a diet with an iron content of 0.275 mg/g. Iron load was produced at 2 levels (45 and 80 mg) by daily intragluteal injections of 5 mg iron as iron sorbitol for 9 or 16 days. Studies were carried out 12-24 days after the last injection. Bile and pancreatic juice were collected by cannulation of the biliary duct at a proximal and distal site. Desferrioxamine B (50 mg) increased biliary iron 3-fold in normal rats and 24- and 32-fold in 45- and 80-mg iron-loaded rats. The 25 mg dose of DFB increased biliary iron 13-fold in the 45-mg iron-loaded rats. There was no effect with CaDTPA. Biliary iron excretion was independent of bile volume. The iron content of the bile in normal and 45-mg iron-loaded rats was similar when collected under control conditions. Insignificant iron excretion occurred in the pancreatic juice in normal and iron-loaded rats following DFB and CaDTPA. The marked biliary iron excretion noted with DFB suggests that this might be the principal source of the elevated fecal iron observed in patients with iron-storage disease treated with DFB.

4676 **AMINO ACID MOVEMENTS BETWEEN GUT, LIVER, AND PERIPHERY IN UNANESTHETIZED DOGS.** *(E.)* Elwyn, D. H. (Hektoen Inst. Med. Res., Chicago, Ill.), H. C. Parikh and W. C. Shoemaker. *Amer J Physiol* 215(5):1260-1275, 1968.

The concentrations of free amino acids and urea in plasma, erythrocytes, and whole blood from arterial, portal, and hepatic venous catheters were measured, together with hepatic blood flow, for 24-hr periods in 3 unanesthetized dogs on horsemeat diets, 4-5 days after implantation of the catheters. The essential-amino-acid composition of the venous flow from the intestine was similar to that of the meal. Aspartate and glutamate were largely converted to alanine, ammonia, glutamine, and glutathione. Total output from the intestine was greater than the meal in 2 animals and somewhat less in the 3rd animal. Liver uptake, which was greater than intestinal output in 2 animals, but less in the 3rd, was apparently regulated by net protein synthesis or breakdown. There were large variations in urea synthesis rates during the 24-hr study period, but similar patterns were present between animals. Relatively little catabolism of leucine, isoleucine, and valine occurred in the liver. Glutathione, synthesized in both intestine and liver, was transported to the periphery in the erythrocytes. Splanchnic amino acid outputs were quite constant over 24 hr and were usually negative. High positive splanchnic outputs were associated with net hepatic protein breakdown and high amino-acid concentrations in the erythrocytes.

4677 **RADIOIMMUNOASSAY OF SECRETIN IN HUMAN SERUM.** *(E.)* Young, J. D. (St. Vincent's Hosp., Sydney, Australia), L. Lazarus, D. J. Chisholm and F. F. V. Atkinson. *J Nucl Med* 9(12):641-642, 1968.

4678 **BILIRUBIN PRODUCTION IN ENDOTOXIN-TREATED OR TUMOR-BEARING RATS** *(E.)* Eddington, C .L. (Biomed. Div., Samuel Roberts Noble Found., Ardmore, Okla.) and R. F. Kampschmidt. *Proc Soc Exp Biol Med* 129(2):580-584, 1968.

4679 **CELL WALL COMPOSITON AND VIRULENCE IN *ESCHERICHIA COLI*.** *(E.)* Medearis, D. N. (Johns Hopkins U. Sch. Med., Baltimore, Md.), B. M. Camitta and E. C. Heath. *J Exp Med* 128(3):399-414, 1968.

4680 **INSULIN-LIKE ACTIVITY OF PROTEASES AND PHOSPHOLIPASES.** *(E.)* Zakim, D. (Fitzsimons Gen. Hosp., Denver, Colo.) and R. H. Herman. *Amer J Clin Nutr* 21(10):1216-1219, 1968.

4681 **ANATOMY AND PHYSIOLOGY OF THE ABDOMINAL LYMPHATICS.** *(Ger.)* Horstmann, E. (Inst. Anat., U. Hamburg, Germany). *Aktuel Gastroent* pp. 26-33. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

4682 **BIOCHEMICAL ASPECTS OF LYMPH FORMATION.** *(Ger.)* Voigt, K. D. (2nd Med. Clin. & Polyclin., U. Hamburg, Germany). *Aktuel Gastroent* pp. 41-49 [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

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4683 RELATIONSHIP OF EARLY LIPID CHANGES IN KIDNEY AND LIVER TO THE HEMORRHAGIC RENAL NECROSIS OF CHOLINE-DEFICIENT RATS. *(E.)* Simon, J. B. (Yale U. Sch. Med., New Haven, Conn.), R. Scheig and G. Klatskin. *Lab Invest* 19(5):503-509, 1968.

Renal and hepatic lipid changes produced by choline deficiency were investigated in relation to hemorrhagic renal necrosis. Kidneys of weanling male rats fed a choline-deficient diet developed fat accumulation prior to necrosis which was demonstrated both histologically and chemically. Although this accumulation was not present in chow-fed animals, it did occur in rats fed the deficient diet supplemented with choline, indicating causation by dietary factors other than choline deficiency *per se.* The renal phospholipid concentration fell coincident with hemorrhagic necrosis because of an increase in renal weight, but the total phospholipid content remained constant. Moderate depression of arachidonic acid was the only alteration in the fatty acid composition of the kidney during choline deficiency, and the fatty acid pattern did not further change when necrosis developed. In the liver, choline deficiency produced striking fatty infiltration accompanied by a fatty acid pattern showing low stearic acid, high oleic acid, and low arachidonic acid. When renal necrosis developed, liver triglycerides fell, probably due to reduced food intake; however, the hepatic fatty acid proportions did not change. Contrary to previous proposals, neither accumulation of renal fat nor a deficit in renal phospholipid causes the hemorrhagic necrosis of choline deficiency. Changes in renal fatty acid composition are probably not of pathogenetic importance. Hepatic lipid changes in choline deficiency appear to be independent of those in the kidney.

4684 EFFECT OF PROLONGED ALCOHOL CONSUMPTION IN RATS ON PANCREATIC PROTEIN SYNTHESIS. *(E.)* Sardesai, V. M. (Wayne State U. Sch. Med., Detroit, Mich.) and J. M. Orten. *J Nutr* 96(2):241-246, 1968.

The effects of prolonged alcohol consumption in rats on the biosynthesis of pancreatic proteins, including trypsin and ribonuclease, was determined by both *in vivo* and *in vitro* techniques. Sprague-Dawley rats were fed an adequate regular diet and maintained on 20% ethanol as the sole drinking fluid during a 48-week observation period. Control rats received the same diet with water *ad libitum,* and pancreatic protein synthesis was determined in both groups at 10-week intervals. *In vivo* protein synthesis was evaluated by the incorporation of i.v. injected DL-leucine-1-^{14}C into the pancreatic tissue protein 45 min after the injection. *In vitro* synthesis was evaluated by 4-hr incubation of pancreatic slices with an amino acid mixture containing DL-leucine-1-^{14}C and an ATP generating system. Protein synthesis was determined by: 1) incorporation of radioactive leucine into pancreatic protein, 2) tryptic activity, 3) ribonuclease activity. Both the *in vivo* and the *in vitro* experiments demonstrated a decrease in protein synthesis (including trypsin and ribonuclease) by the pancreas of animals maintained on 20% ethanol. These results are ascribed to the effect of ethanol *per se* on pancreatic tissue rather than to any major alterations in caloric or protein intake.

4685 ON THE OCCURRENCE OF PHENOL AND STEROID SULPHOKINASES IN THE HUMAN GASTROINTESTINAL TRACT. *(E.)* Boström, H. (Serafimer Hosp., Karolinska Inst., Stockholm, Sweden), D. Brömster, H. Nordenstam and B. Wengle. *Scand J Gastroent* 3(4):369-375, 1968.

The distribution of phenol and steroid sulfokinases in the mucosa of the gastrointestinal tract was determined by the use of ^{35}S-labelled 3'-phosphoadenosine-5'-phosphosulfate (PAPS). The specimens studied were obtained from the stomach, jejunum, ileum, and colon of patients undergoing surgery for gastric or duodenal ulcer or neoplastic gastrointestinal disease. Only specimens with a normal histologic appearance were used. Phenol and estrone sulfokinase were present in all levels of the gastrointestinal tract. The various steroid alcohol sulfokinases studied (dehydroepiandrosterone [DHA], androsterone, etiocholane-3α-ol-17-one, pregnane-3α-ol-20-one, and pregnane-3β-ol-20-one) were detected in the jejunal mucosa only. The optimal pH value of some of the sulfokinases were estimated and found to be 6.3 for DHA sulfokinase, 5.5 for androsterone sulfokinase, and 7.2 for phenol sulfokinase in a preparation of jejunal mucosa.

4686 JEJUNAL BIOPSY FINDINGS IN HEALTHY YOUNG MEN. *(E.)* Burhol, P. G. (Ullevål Hosp., Oslo, Norway) and J. Myren. *Scand J Gastroent* 3(4):346-350, 1968.

In 21 healthy young men, 19-24 yr old, biopsies were obtained with a Crosby-Kugler capsule from the proximal jejunal mucosa. One-half of the biopsy specimen was fixed in formalin and studied by surface microscopy. Cryostat sections from the other half were incubated in a solution containing Nitro-BT (2,2'-di-p-nitrophenyl-5,5'-diphenyl-3,3'-(3,3'-dimethoxy-4,4'-biphenylene)-ditetrazolium chloride), phosphate buffer, and specific substrates to demonstrate the activity of succinic- (SD), lactic- (LD), glucose-6-phosphate- (G-6-PD), nicotinamide adenine dinucleotide- (NADD), and nicotinamide adenine dinucleotide phosphate dehydrogenase (NADPD), resp. Mucosal measurements were performed in the cryostat sections with a micrometer. Histologically, 12 subjects were classified into Group I with long, slender villi, of which 10 showed finger- and 2 showed leaf-shaped villi by surface microscopy. The remaining 9 subjects were classified into Group II with branched and fused villi. Of these subjects, 6 showed leaf- and 3 showed finger-shaped villi by surface microscopy. Normal activity of LD, NADD and NADPD was found in all cases, whereas a moderately depressed activity of SD and G-6-PD seemed to be present in the biopsies from 2 and 4 subjects, resp., in each group. No significant differences were obtained between the mucosal measurements in the 2 groups.

4687 PANCREATIC ACINAR CELL REGENERATION. IV. REGENERATION AFTER SURGICAL RESECTION. *(E.)* Lehv, M. (Coll. Med., State U. New York, Brooklyn) and P. J. Fitzgerald. *Amer J Path* 53(4):513-535, 1968.

The splenic and gastric segments of the adult rat pancreas were resected and the change in weight of the residual duodenal segment was compared with the weight of the duodenal segment of control animals for up to 1 yr after operation. Thymidine-^{3}H labeling was used to study DNA synthesis during the same period. A total of 227 male Wistar rats were divided into lots to be sacrificed at varying intervals up to 1 yr; each lot was subdivided into control, abdominal sham-operated and partially pancreatectomized groups. At sacrifice, the pancreatic parabiliary and duodenal segment weight, total pancreas weight and total body weight were determined. At 9 and 12 months after operation, the residual pancreatic segments weighed 50% more than the corresponding segments in control and sham-operated animals. The average weight of the residual pancreas in the partially pancreatectomized animals increased from 44% of the total pancreas weight at operation to 66% of the total pancreas weight at 9 and 12 months after operation. DNA synthesis in pancreas acinar cells showed a 3-fold increase above control values 36 hr after operation. Histologic and cytologic features of the regenerated pancreas tissue were generally similar to those of control animals except for an increase in mitotic figures 1 and 2 days after operation. Amylase and chymotrypsinogen enzyme activities of pancreatic tissue examined 12 months after operation were essentially similar in all groups. The relatively slow rate of pancreatic regeneration after partial pancreatectomy compared to the rate noted in post-ethionine studies indicate that different mechanisms may operate in the 2 models to increase DNA synthesis, although both may be initiated by the loss of pancreas tissue.

4688 CONTROL OF JEJUNAL SUCRASE AND MALTASE ACTIVITY BY DIETARY SUCROSE OR FRUCTOSE IN MAN. *(E.)* Rosensweig, N. S. (Fitzsimons Gen. Hosp., Denver, Colo.) and R. H. Herman. *J Clin Invest* 47(10):2253-2262, 1968.

The specific effects of sucrose, maltose, lactose, glucose, fructose and galactose on jejunal disaccharidase activity were studied in 7 normal, nonfasted, male volunteers (19-25 yr old). Jejunal biopsies were obtained after 1-28 days on a 2800-3000 calorie liquid diet containing casein, corn oil and variable amounts of the different carbohydrates. Sucrose feeding, as compared to glucose feeding, significantly increased jejunal sucrase and maltase activities, but not lactase activity, in all subjects. Fructose feeding gave similar results in 2 subjects, but lactose, galactose and maltose, when compared to glucose, did not increase disaccharidase activity. Fructose appears to be the active principle in the sucrose molecule. These results demonstrate that specific dietary sugars can alter enzyme activity in the small intestine of man in a specific fashion. Dietary alteration may represent a suitable system for studying the regulation of enzyme activity in man.

4689 AMPULLARY BIOPSY: A CRITICAL APPRAISAL BASED ON A HISTOLOGICAL STUDY OF THE NORMAL PAPILLA OF VATER. *(E.)* De Sanctis, C. (Dept. Surg., Catholic U., Rome, Italy), and G. Tagliaferri. *Brit J Surg* 55(4):250-255, 1968.

A histological study of the ampulla of Vater was carried out in autopsy material from 25 subjects of various ages, deceased from different causes and free of duodenal, bile-duct, or pancreatic disease. It was found that the papilla is the seat of frequent structural alterations, the most important being noted in elderly subjects. The most common changes were adenoconnective dysplasias with a clear prevalence of centrifugal glandular proliferation. Inflammatory phenomena were common, but not noteworthy. These changes were aspecific and were not related to disease of the papilla itself nor of the ducts which flow into it; rather, they were due to involutionary processes of wear. Such alterations are on the borderline between the normal and the pathological. These results greatly decrease the value of papillary biopsy carried out during transduodenal sphincterotomy, especially in elderly patients.

4690 STUDIES ON CELLULAR AUTOPHAGOCYTOSIS: THE FORMATION OF AUTOPHAGIC VACUOLES IN THE LIVER AFTER GLUCAGON ADMINISTRATION. *(E.)* Arstila, A. U. (Duke U. Med. Ctr., Durham, N. C.) and B. F. Trump. *Amer J Path* 53(5):687-733, 1968.

The origin of the hydrolytic enzymes found in autophagic vacuoles and of the membranes enclosing these vacuoles, as well as the control mechanisms and metabolic requirements involved in autophagy, were studied in male Sprague-Dawley rats (150-250 g in weight) following a single i.p. injection of glucagon (100 μg/100 g body weight). After administration of glucagon, a marked redistribution was observed in the acid phosphatase activity peaks in density gradient fractions of the hepatic lysosomes. This was interpreted as indicating transfer of enzyme from pre-existing hydrolase-containing components to newly formed autophagic vacuoles. The membranes limiting the autophagic vacuoles were found to originate from cisternae of endoplasmic reticulum. This conclusion is supported by the use of histochemical marker enzymes and by the results of membrane measurements. Mechanisms for the transformation of the limiting membrane from the smaller to the larger sizes are proposed. The acid hydrolases found within autophagic vacuoles appear to arise through transfer from Golgi vesicles or primary lysosomes or by the pre-existing fusion with the double membrane-limited sac limiting the early autophagic vacuoles. This transfer of enzyme appears to require high energy compounds, possibly ATP, but does not require protein synthesis. Mixing of contents between newly formed autophagic vacuoles and pre-existing secondary lysosomes occurs to a limited extent.

4691 THE TIME OF APPEARANCE AND DISTRIBUTION OF SULPHOGLYCOPROTEIN ANTIGENS IN THE HUMAN FOETAL ALIMENTARY CANAL. *(E.)* Häkkinen, I. (Dept. Med. Microbiol., U. Turku, Finland), L. K. Korhonen and L. Saxén. *Int J Cancer* 3(5):582-592, 1968.

In material from 39 fetuses between 6 and 16 weeks of gestation and a supplementary autopsy series of 12 newborns, the presence of sulfoglycoprotein antigens in the fetal alimentary canal was studied by the immunofluorescence technique, using specific rabbit antisera prepared against the sulfoglycoproteins of the human alimentary canal in adults (normal superficial, intestinal, and cancer antisera); the presence of sulfomucins was also demonstrated histochemically in adjacent sections. The 3 sulfoglycoproteins found earlier in normal and pathological adult gastric mucosa appeared between 7 and 8 weeks of gestation and all were present in the fetal alimentary epithelium. The typical location of these antigens showed characteristics either of the normal adult distribution or of the distribution found under pathological conditions in the gastric epithelium. The cancer antigen present in cancerous gastric epithelium in adults has now been tentatively named the fetal sulfoglycoprotein antigen (FSA). Based on a comparison of the distribution of the sulfoglycoprotein antigens detected by immunofluorescence and that of the sulfomucins seen by histochemical methods, it is suggested that these antigens are mainly situated in sulfated molecules.

4692 A FORMOL-FLUORESCENCE, FINE-STRUCTURAL AND AUTORADIOGRAPHIC STUDY OF THE ADRENERGIC INNERVATION OF THE VASCULAR TREE IN THE INTACT AND SYMPATHECTOMIZED PANCREAS OF THE CAT. *(E.)* Lever, J. D. (Dept. Anat., U. Wales, Cardiff), T. L. B. Spriggs and J. D. P. Graham. *J Anat* 103(1):15-34, 1968.

Cats of either sex weighing 1-4 kg (4 normal and 9 sympathectomized) were used to provide specimens of pancreas for fluorescence and electron microscopy. Ablation of the sympathetic nerve supply to the pancreas was effected by bilateral celiac ganglionectomy and simultaneous stripping of the celiac and anterior mesenteric arteries of all visible adventitial nerve bundles for a distance of 5 mm from the aorta. Nerve distribution along the vascular tree in the pancreas was studied by means of catecholamine-fluorescence, electron microscopy and autoradiography (^{3}H-norepinephrine). Unmyelinated nerves were demonstrated in relation to arteries, arterioles, and capillaries but not to small veins. The structural change between arteriole and capillary was not abrupt: the muscle component of the arteriole became progressively attenuated and incomplete. Axon counts per nerve-bundle deep and superficial to the adventitial sheath of arterioles and in relation to capillaries suggested 2 nerve distributions: vasomotor and parenchymal. The adrenergic nature of the nerve terminals on arteriolar walls was suggested in autoradiographs by the specific localization of ^{3}H-norepinephrine and by the degeneration and ultimate disappearance of the majority of these axons after sympathectomy.

4693 AMYLASE ISOENZYMES IN THE DEVELOPING CHICK PANCREAS. *(E.)* Heller, H. (Dept. Biol. Chem., Hebrew U., Jerusalem, Israel) and R. G. Kulka. *Biochim Biophys Acta* 165(3):393-397, 1968.

Two amylase isoenzymes ("fast" and "slow") were detected in pooled pancreatic homogenates of 8- and 20-day-old chick embryos by polyacrylamide gel electrophoresis at 4C with a 3-milliamp current per tube. Both isoenzymes were produced throughout embryonic development in approximately the same proportions. Examination of pancreatic homogenates of individual chicks revealed 3 phenotypes which had only fast, only slow, or fast plus slow amylase isoenzymes, resp. The distribution of the phenotypes in the chick population suggested that the slow and fast amylase types are the products of 2 allelic genes.

4694 INTRAHEPATIC VASCULAR PATHWAYS: HEPATIC ARTERIOPORTAL SHUNT. *(E.)* Geumei, A. M. (Fac. Med., Alexandria U., Egypt, UAR), M. Mahfouz and A. Aboul-Enein. *J Surg Res* 8(10):463-470, 1968.

Physiological, pharmacological, and radiological techniques were used to elucidate the intrahepatic vascular pathways and the dynamics of the hepatic circulation in the isolated canine liver. A study of the intrahepatic distribution of hepatic arterial flow showed that part of it is shunted into the portal venous system before the sinusoidal level. The portal venous blood is mainly arteriovenous. Arterial blood supplies the parenchymal cells of the liver, and portal venous blood has no access to the arterial system even under high portal venous pressure. This suggests the presence of a unidirectional arterioportal shunt, which may explain the mechanism by which arterial blood controls portal venous flow. It also demonstrates the role of arterial blood in liver function. This unidirectional arterioportal shunt was confirmed by pharmacological and radiological techniques. The autoregulatory nature of pressure-flow responses in both hepatic arterial and portal venous systems was demonstrated. The importance of the portal vein as an outflow tract under the influence of some drugs was illustrated by measurements of the difference between hepatic arterial and portal venous vascular responses.

4695 ON THE INCREASE OF BINUCLEATE CELLS IN THE GANGLION CELLS OF DOG SMALL INTESTINE DUE TO EXPERIMENTAL ISCHEMIA. *(E.)* Nagata, T. (Dept. Anat., Shinshu U., Japan). *Med J Shinshu U* 12(2):93-113, 1968.

Nine dogs were operated on and ischemia of a jejunal loop was produced by perfusing with Tyrode's solution through the mesenteric arteries. In tissues taken from both the ischemic and the adjoining normal control loops at various time intervals, amitotic and binucleate cells were counted in Auerbach's and Meissner's plexi. In both plexi, the frequency of binucleate cells increased during ischemia and persisted for more than 100 days. Amitotic cells also increased in the ischemic preparations but no mitotic division was seen. In 4 dogs, either thymidine-^{3}H or cytidine-^{3}H was injected after ischemia. There was no radioautographic evidence of DNA synthesis in the ganglion cells of either plexus from either normal or ischemic loops. The rate of RNA synthesis was higher in the ganglion cells from normal loops than from ischemic loops, and higher in Auerbach's than in Meissner's plexus. It was also higher in amitotic cells. There was a close association between RNA synthesis and recovery of the ganglion cells. It is concluded that the number of binucleate cells in the enteric plexus can increase under certain pathological conditions by means of amitotic division, which can be explained as an effort by the cells to survive under unfavorable conditions.

4696 THE POSTNATAL DEVELOPMENT OF THE PANCREAS IN WHITE RATS. *(Rus.)* Sidorova, V. F. (Inst. Exp. Biol., Acad. Med. Sci. USSR, Moscow) and A. G. Babaieva. *Biull Eksp Biol Med* 65(5):105-109, 1968.

4697 KARYOMETRIC STUDIES ON RAT LIVER FOLLOWING ADMINISTRATION OF ESTROGENIC HORMONES. *(Ger.)* Piroth, M. (Inst. Path., U. Saar, Homburg, Germany) and E. van de Berg. *Endokrinologie* 52(5/6):373-379, 1968.

4698 MORPHOLOGY, LOCALIZATION AND BEHAVIOR OF THE BASAL-GRANULATED (ENTEROCHROMAFFIN) CELLS IN THE HUMAN GASTRODUODENAL MUCOSA. *(Ger.)* Fresen, O. (Inst. Path., Hannover, Germany) and J. Holzki. *Z Zellforsch* 90(2):296-319, 1968.

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4699 EXPERIMENTAL STUDIES ON THE INTRAMURAL PASSAGES THROUGH THE WALL OF THE GASTRODUODENAL TRACT: I. EXPERIMENTAL STUDIES ON THE PASSAGE OF INDIA INK FROM THE PYLORUS TO THE DUODENUM IN RATS: II. EXPERIMENTAL STUDIES ON THE DUODENAL SPREAD OF WALKER CARCINOSARCOMA 256 TRANSPLANTED INTO THE STOMACH WALL IN RATS. *(Jap.)* Hirose, S. (Nagoya City U. Med. Sch., Japan). *J Nagoya City Univ Med Ass* 19(1): 303-316, 1968.

4700 AN ELECTRON MICROSCOPIC STUDY OF THE FUNCTIONAL STATES OF THE HEPATIC SINUSOIDS. *(Ger.)* Cossel, L. (Inst. Path., Karl-Marx U., Leipzig, Germany). *Beitr Path Anat* 137(3):287-315, 1968.

4701 THE RADIOLOGICAL ANATOMY OF THE HEPATIC VENOUS SYSTEM: PHLEBOGRAPHIC ASPECTS OF VENOUS ANGIOCARDIOGRAPHY. *(It.)* Bottero, M. (Inst. Radiol., U. Padua, Italy), R. Bernardi and P. Gasparini. *G Veneto Sci Med* 22(Suppl.):1-18, 1967.

4702 METABOLISM AND PHYSIOLOGICAL ROLE OF HISTAMINE IN THE STOMACH. *(Ger.)* Lorenz, W. (Inst. Clin. Chem., U. Munich, Germany) and K. Pfleger. *Klin Wschr* 46(2):57-71, 1968.

4703 CARBONIC ANHYDRASE ACTIVITY OF MUCOSA OF SMALL INTESTINE AND COLON. *(E.)* Kryukova, I. N. (Dept. Biochem., U. Oxford, England) and D. S. Parsons. *Nature* 219(5150):175-177, 1968.

4704 β-GALACTOSIDASE ACTIVITY OF THE JEJUNUM AND ILEUM OF NEWBORN, SUCKLING AND WEANED RATS: COMPARISON OF ACTIVITIES OF β-GALACTOSIDASE TOWARDS DIFFERENT SUBSTRATES AT DIFFERENT pH. *(E.)* Asp, N. G. (Inst. Physiol., Chechoslovak Acad. Sci., Prague), O. Koldovsky and J. Hoskova. *Physiol Bohemoslov* 17(3):229-236, 1968.

4705 OBSERVATIONS ON THE CAPILLARY CIRCULATION OF THE LIVER. *(Ger.)* Stefenelli, N. (1st Med. Clin., U. Vienna, Austria). *Aktuel Gastroent* pp. 103-106. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

4706 THE ORIGIN AND SURVIVAL OF GASTRIC PARIETAL CELLS IN THE MOUSE. *(E.)* Ragins, H. (Albert Einstein Coll. Med, New York City), F. Wincze S. M. Liu and M. Dittbrenner. *Anat Rec* 162(1):99-106, 1968.

4707 FURTHER EVIDENCE FOR THE PRESENCE OF NON-ADRENERGIC INHIBITORY STRUCTURES IN THE GUINEA-PIG COLON. *(E.)* Bianchi, C. (Dept. Pharmacol., U. Pisa, Italy), L. Beani, G. M. Frigo and A. Crema. *Europ J Pharmacol* 4(1):51-61, 1968.

4708 MITOTIC ACTIVITY OF GASTRIC MUCOSA: A STUDY BY MEANS OF COLCEMID. *(E.)* Liavag, I. (Ullevål Hosp., Oslo, Norway). *Acta Path Microbiol Scand* 72(1):43-63, 1968.

4709 STUDIES ON DISACCHARIDASE ACTIVITIES OF THE SMALL INTESTINE OF THE DOMESTIC CAT AND OTHER CARNIVOROUS MAMMALS. *(E.)* Hore, P. (Royal Child. Hosp. Res. Found., Parkville, Australia) and M. Messer. *Comp Biochem Physiol* 24(8):717-725, 1967.

See also abstract nos.: 5527,5545

ABSORPTION

4710 INTESTINAL VITAMIN B_{12} ABSORPTION IN THE DOG. III. DEMONSTRATION OF THE INTRACELLULAR PATHWAY OF ABSORPTION BY LIGHT AND ELECTRON MICROSCOPE AUTORADIOGRAPHY.

(E.) Weisberg, H. (New York Med. Coll., New York City), J. Rhodin and G. B. J. Glass. *Lab Invest* 19(5):516-525, 1968.

The intracellular pathway of vitamin B_{12} absorption in the dog intestine *in vivo* was visualized by light and electron microscope autoradiography. The terminal ileum of each of 5 anesthetized mongrel dogs was divided by ligatures into separate 5-cm long *in situ* sacs; the lumen of each sac was washed thoroughly and filled with 0.75 μg (about 10 μC) of ^{57}Co-B_{12}. At 30-min, and at 1, 2, and 3-hr intervals, the sacs were excised and prepared for autoradiography. During the initial 2-hr period following intraluminal radio-B_{12} instillation, label was localized principally in the surface mucus granules of goblet cells in both crypts and villi. At 3 hr, radioactivity was predominantly localized in mucosal absorbing cells and underlying lamina propria on light microscopy. On electron microscopy, radioactivity was localized in the area of the microvilli, terminal web, rough endoplasmic reticulum, Golgi apparatus, lateral cell membranes and intercellular spaces, lamina propria, and capillaries of the lamina propria. These results suggest that goblet cell mucus B_{12} binders may play a role in the intestinal absorption of vitamin B_{12}, and that certain B_{12} transport proteins are synthesized within the endoplasmic reticulum of intestinal absorbing cells and are complexed with absorbed B_{12} during its passage through the cell before reaching the blood stream.

4711 DIFFUSIVE–CONVECTIVE MODELS FOR INTESTINAL ABSORPTION OF D_2O. *(E.)*

Lifson, N. (Dept. Physiol., U. Minnesota, Minneapolis), L. M. Gruman and D. G. Levitt. *Amer J Physiol* 215(2):444-454, 1968.

The kinetics of movement of urea into or out of closed loops of dog small intestine has previously been found to be reasonably consistent with a model incorporating both diffusive and convective terms as independent linear contributions. This model assumes that the rate of transport of a solute for which the intestine has no special or active transport mechanisms is described by:

$$\frac{\Delta A}{t} = K_a(C_L - C_P) + \phi_a J_v C_L \quad (J_v \geq 0) \text{ where } \Delta A \text{ is the}$$

net amount of solute a absorbed in time t; K_a is the diffusive permeability of the loop to the solute; ϕ_a is a convective sieving factor for the solute, equal to the ratio of the solute concentration in the convective component to that in the lumen; J_v is the net rate of fluid absorption; and C_L and C_P are the solute concentrations in the lumen and plasma, resp. In the present paper, data originally obtained by Berkas (Thesis, U. Minnesota, Minneapolis, 1960) for the absorption of D_2O from duodenal, jejunal, ileal and colonic segments of anesthetized dogs were analyzed to determine the applicability of the same simple model to the kinetics of D_2O transport. In these experiments, fluids of known volume and composition were placed in loops of bowel, allowed to remain there for about 10 minutes, and then removed for measurement of volume and solute concentrations. Measurements were made of net and (except for chloride) unidirectional isotopic fluxes of D_2O, sodium and chloride between the blood and each of 4 luminal fluids: 0.33, 1.0, 1.5 and 3.0 times isotonic NaCl. A sufficiently close fit was obtained between the model and the data to imply that diffusion and convection do not interact in the small intestine and that net fluid transport is convective in nature. However, the applicability of several other models is also considered, including the possibility of diffusion acting alone, the fluid-circuit model of Visscher *et al.*, the possibility of independent "isotonic" and osmotic streams, and a mean transmembrane convective concentration model. In an appendix, the equation for interaction between diffusion and convection is solved for the conditions of block flow.

4712 SECRETION OF PURINES BY THE SMALL INTESTINE: TRANSPORT MECHANISM. *(E.)*

Berlin, R. D. (Harvard Med. Sch., Boston, Mass.) and R. A. Hawkins. *Amer J Physiol* 215(4):942-950, 1968.

An analysis of the separate transport functions of the limiting membranes of intestinal epithelial cells in the active secretion of purines is presented. A quantitative method was developed, based on the intracellular metabolism of xanthine and hypoxanthine by xanthine oxidase, for determining the steady-state unidirectional influx across separate cell membranes without measuring the initial rates. The results of studies with isolated and perfused hamster intestine suggest that the basal or contralumenal membrane is a major site of active secretion, and that the chemical species of purines are discriminated at this surface. The bulk of intracellularly generated xanthine and urate effluxes from the cell preferentially across the lumenal border. Kinetically, the epithelium appears to behave as a single compartment for hypoxanthine, xanthine and urate. Cell influx across the basal membrane is independent of the sodium ion gradient, and secretion occurs in sodium-free media.

4713 EFFECTS OF TONICITY AND GLUCOSE ON INTESTINAL SODIUM AND WATER ABSORPTION IN THE RAT.

(E.) Summers, R. W. (U. Iowa Coll. Med., Iowa City) and H. P. Schedl. *Scand J Gastroent* 3(4): 376-382, 1968.

The small intestine of male Sprague-Dawley rats was perfused *in vivo* with solutions of varying sodium concentration; while some solutions were hypotonic, glucose or mannitol was added to others to make them isosmotic. Sodium absorption was found to be a function of sodium concentration from both isosmotic and hypotonic solutions. The increased water absorption from a slightly hypotonic solution was associated with increased sodium absorption. With a markedly hypotonic solution, net sodium entry into the lumen and decreased water absorption suggested disruption of membrane integrity. Glucose absorption was associated with increased sodium and water absorption. The increase in sodium absorption was greater than predicted from solvent drag by the volume of water associated with absorption of the glucose in isosmotic solution. Sodium influx was also increased in the glucose solution, indicating a relation between glucose absorption and sodium transport. All glucose effects were abolished by phlorrhizin.

4714 RAT INTESTINAL DIPEPTIDASE ACTIVITY DURING ORAL NEOMYCIN AND GLUTEN ADMINISTRATION. *(E.)* Peternel, W. W. (U. Pittsburgh Dept. Med., Pa.) and P. Bell Jr. *J Nutr* 96(2):236-240, 1968.

The mechanism of neomycin-induced azotorrhea and the role of dietary gluten were studied by measuring intestinal dipeptidase activity in rats given neomycin with or without dietary gluten. Rats fed a 10%-wheat-gluten + 8%-casein diet or 18% casein (gluten-free) diet were given 100 mg neomycin daily by gastric tube for 7 days. Control groups were fed the appropriate diet, but without neomycin. Homogenates of intestinal mucosa were assayed for dipeptidase activity, using various substrates. Mean dipeptidase activity was suppressed only in the rats fed 10% gluten plus neomycin. Rats given neomycin and fed an 18%-casein (gluten-free) diet had normal intestinal dipeptidase activity. Neomycin inhibited weight gain in both experimental groups. The observed depression of dipeptidase activity may explain in part the increased fecal nitrogen excretion observed in man during neomycin administration. The experimental data indicate that neomycin, in the presence of gluten, partially inhibits intestinal dipeptidase activity.

4715 ACTIVE TRANSPORT OF L-GLUCOSE BY ISOLATED SMALL INTESTINE OF THE DIETARY RESTRICTED RAT. *(E.)* Neale, R. J. (Dept. Physiol., U. Sheffield, England) and G. Wiseman. *J Physiol* 198(3):601-611, 1968.

The effect of semistarvation and complete starvation (no food for 4-5 days) on the active transport of L-glucose was studied using sacs of everted mid-small intestine prepared from adult male rats. Sacs from animals on a restricted diet (6-10 g food daily for 9 days) transported L-glucose against a concentration gradient, but sacs from fully fed rats did not. Even when sacs from fully fed rats were distended sufficiently to cause them to lose serosal volume, the L-glucose concentration in the final serosal fluid was never greater than that in the final mucosal fluid. The active transport of L-glucose was independent of net water movement, required oxygen, was not demonstrable at 27C, and required Na ions at a concentration of 83 mM or greater. It was completely inhibited by 10^{-6} M phlorhizin, 10 mM L-histidine, or 1.39 mM D-glucose. Phlorhizin at a concentration of 10^{-8} M reduced, but did not prevent, active transport. It seems probable that the active transport of the L-glucose is mediated by the same mechanism which actively transports D-glucose. There appears to be no metabolism of L-glucose by rat intestine, and no conversion to the D-form. The hypothesis that sugars require the D-pyranose ring for active absorption is no longer tenable.

4716 PROXIMAL TO DISTAL SECRETORY AND ABSORPTIVE GRADIENTS OF THE RAT SMALL INTESTINE. *(E.)* Schedl, H. P. (U. Iowa Coll. Med., Iowa City), H. D. Wilson and D. L. Miller. *Proc Soc Exp Biol Med* 129(2):511-515, 1968.

Fasted male albino rats were used in a systematic study of the net movements of water, sodium, and chloride designed to define the functional characteristics of the mucosa in the various regions of the rat small intestine. Secretion of sodium, chloride, and water was most rapid in the proximal small intestine and showed a progressive distal decline when osmotic and concentration gradients were imposed by intraluminal mannitol (300 mM). Like secretion, absorption of sodium, chloride, and water from 152 mM sodium chloride solution was highest proximally and showed a progressive distal decrease. The pattern of transmucosal potential differences showed no correlation with absorption and secretion rates.

4717 ABSORPTION AND SECRETION OF CALCIUM BY THE HUMAN JEJUNUM. *(Ger.)* Ewe, K. (2nd Med. Clin., U. Saar, Homburg, Germany). *Klin Wschr* 46(12):661-666, 1968.

Absorption of isotonic $CaCl_2$ (2.5-26.5 mEq/liter) by the jejunum was studied in 26 normal subjects by means of a 5-lumen catheter which permits transport processes to be studied directly in a segment of intestine 30 cm in length and closed off by two balloons. Calcium secretion was calculated from the results obtained after addition of ^{45}Ca to the test solution. The percent calcium absorbed was found to decrease with increasing calcium concentration, and the rate of absorption did not increase above a calcium concentration of 5.5 mEq/liter, suggesting that the absorptive mechanisms become saturated at higher concentrations. Since the calcium absorption from a solution containing 2.5 mEq/liter took place against a concentration gradient and against net movement of water from the blood to the gut, it is suggested that the human jejunum contains a carrier mechanism for calcium transport. Furthermore, the graphical representation of the absorption data according to the Michaelis-Menten equation conformed to the laws of enzyme kinetics. It can be calculated that the total possible calcium absorption from the small intestine is 2 g/day, or 7 times the amount normally absorbed, and that 0.85 g/day can be secreted. These results may be of interest in determining an appropriate dosage for calcium therapy.

4718 ABSORPTION OF HISTAMINE FROM THE GASTROINTESTINAL TRACT OF DOGS *IN VIVO*. *(E.)* Duncan, J. G. C. (Dept. Pharmacol., U. Strathclyde, Glasgow, Scotland) and N. G. Waton. *J Physiol* 198(3):505-515, 1968.

The absorption of ^{14}C-histamine introduced into the lumen of the ligated intestinal loop or ligated stomach of anesthetized dog dogs was studied by determining the radioactive histamine in the venous blood coming from the ligated part. The injection of 5-5000 μg ^{14}C-histamine into a jejunal loop or of 50 μg into a loop of the duodenum, ileum or colon was detected in 8 successive 15-min samples of venous blood (from 0.4-3.7% recovery). After the injection of 10 mg ^{14}C-histamine into the stomach, radioactive histamine was detected in all samples of venous blood collected during the following 4 hr. Radioactive histamine was also detected in the general arterial blood after injection into the jejunal loop. Arterial perfusion of the jejunal loop with a dextran-saline solution increased the absorption of ^{14}C-histamine. Breakdown of histamine occurred since only a percentage was recovered in the venous blood, wall or contents of the lumen. Recovery was dose-dependent (1% recovery after 5 μg and 29-42% after 5000 μg). In dogs and cats, large amounts of free histamine were found in the gastric contents 2 hr after a meat meal and much smaller quantities appeared in the intestinal loops. It is suggested that the histamine from the food may be a source of tissue histamine and that absorbed histamine may play a role in the gastric and intestinal phase of gastric secretion.

4719 **CALCIUM ABSORPTION IN THE NORMAL, BILE-DUCT LIGATED, AND CIRRHOTIC RAT, WITH OBSERVATIONS ON THE EFFECT OF LONG- AND MEDIUM-CHAIN TRIGLYCERIDES.** *(E.)* Kehayoglou, A. K. (Royal Free Hosp., London, England), H. S. Williams, W. F. Whimster, and C. D. Holdsworth. *Gut* 9(5):597-603, 1968.

The absorption of calcium from aqueous solutions of calcium chloride was studied in unanesthetized rats by measuring either bone deposition of ^{45}Ca or whole body retention of ^{47}Ca. In animals with acute obstruction of the bile duct, calcium absorption was significantly depressed when the oral dose was mixed with olive oil, but not when given as an aqueous solution, whereas in normal animals olive oil did not depress calcium absorption. In normal animals, percentage calcium absorption was slightly but significantly depressed by increasing the carrier dose from 1 mg to 50 mg of calcium, but the size of the carrier dose did not affect percentage absorption in the obstructed rats. Medium-chain triglyceride stimulated calcium absorption in normal, sham-operated, and bile duct-obstructed animals. In animals with chronic obstruction of the bile duct , calcium absorption from an aqueous solution of calcium chloride was significantly less than that found in control animals. The percentage of bone ash was not significantly reduced by chronic bile duct obstruction. Carbon tetrachloride-induced cirrhosis did not affect either calcium absorption or bone ash content.

4720 **AN EVALUATION OF PERFUSION TECHNIQUES IN THE STUDY OF WATER AND ELECTROLYTE ABSORPTION IN MAN: THE PROBLEM OF ENDOGENOUS SECRETIONS.** *(E.)* Sladen, G. E. (St. Bartholomew's Hosp., London, England) and A. M. Dawson. *Gut* 9(5):530-535, 1968.

In an attempt to assess, indirectly, the magnitude of contamination of the perfusion zone by endogenous gastrointestinal secretions from above, the rates of water and sodium absorption from saline and glucose-saline mixtures obtained by means of double- and triple-lumen tube perfusion techniques were compared in 16 and 13 normal subjects, resp. The 2 methods were found to give quantitatively similar rates of water and sodium absorption, suggesting that contamination is negligible in the normal fasting upper jejunum. Absorption of solute and water by the proximal segment of the triple-lumen tube produced difficulties in the control of the experimental situation and in the interpretation of results. The use of the double-lumen tube for studies of this type in normal subjects is therefore considered valid, simpler, and preferable.

4721 **SIMULATION STUDIES OF BLOOD-GLUCOSE REGULATION: EFFECT OF INTESTINAL GLUCOSE ABSORPTION.** *(E.)* Gatewood, L. C. (Mayo Clin., Rochester, Minn.), E. Ackerman, J. W. Rosevear and G. D. Molnar. *Computers Biomed Res* 2(1):15-27, 1968.

Analog simulatins were performed on a Philbrick SK5 analog computer to test inherent approximations and to determine the relative importance of some of the biological mechanisms involved in the blood-glucose regulatory system in predicting the response to an oral glucose load. In order to examine the effect of the form used for intestinal glucose absorption, 3 levels of approximation were simulated and evaluated in terms of physiological similarity and control system response. For intestinal absorption characteristics and insulin clearances in the normal range and for appropriately sized glucose loads, a small number of measurements (4-7) sufficiently characterized the glucose response. However, in some simulated conditions, intestinal absorption parameters could be shown to mask intrinsic characteristics of the glucose-hormonal control system that might be reflected in the response to an oral glucose-tolerance test.

4722 **EFFECT OF TOTAL PANCREATECTOMY ON CHOLESTEROL ABSORPTION AND THE SERUM CHOLESTEROL LEVEL IN MAN.** *(E.)* Bell, C. C. Jr. (McGuire VA Hosp., Richmond, Va.) and L. Swell. *Proc Soc Exp Biol Med* 128(2):575-577, 1968.

The appearance of ^{14}C-activity in the following oral administration of cholesterol-4-^{14}C was determined in 6 normal subjects and 2 totally pancreatectomized patients. In the pancreatectomized subjects determinations were made both during administration of oral pancreatin and when it was withheld. Very little absorption of the orally administered cholesterol-4-^{14}C occurred in the 2 pancreatectomized subjects when oral pancreatin was withheld: during this period, serum cholesterol levels dropped to less than 100 mg%. When oral pancreatin was restored to 1 of the subjects, cholesterol was absorbed and the serum cholesterol level returned to 200 mg%. These results indicate that pancreatic secretions are necessary for the proper absorption of cholesterol and the maintenance of the blood cholesterol level in man.

4723 **ABSORPTION OF AMINO ACID MIXTURES DEVOID OF LEUCINE FROM RAT INTESTINAL LOOPS.** *(E.)* Yamada, C. (Sch. Publ. Hlth., U. California, Los Angeles) and M. E. Swendseid. *Amer J Clin Nutr* 21(10):1194-1196, 1968.

Isolated intestinal loops, 8 cm long, were constructed in the upper jejunum of male Sprague-Dawley rats and used to investigate the absorption of all the amino acids in casein-like mixtures with and without leucine, isoleucine, or threonine. The removal of leucine increased glutamic acid, serine, valine, isoleucine, tyrosine, phenylalanine, and methionine absorption from the mixtures; the absence of threonine and isoleucine did not affect the absorption of any amino acids. Increased absorption of some amino acids is a partial explanation for the extreme alterations in amino acid pool composition that accompany leucine-deficiency states.

4724 **OBSERVATIONS ON THE MECHANISM OF IRON ABSORPTION.** *(E.)* Kuhn, I. N. (Dept. Med., Loma Linda U., California), M. Layrisse, M. Roche, C. Martinez and R. B. Walker. *Amer J Clin Nutr* 21(10):1184-1188, 1968.

The effects of ascorbic acid (0.5 g), phytate (0.5 g), and desferrioxamine (2.0 g) on the absorption of iron from corn, wheat and soybeans, grown in media containing ^{59}Fe (2-8 μC), and ^{59}Fe-ferritin were investigated in 58 healthy volunteers, 11-60 yr of age; the absorption of ^{55}Fe-ferrous ascorbate (15-75 μC) was also determined and the results were expressed as the ratio of food iron absorption to ferrous ascorbate absorption. The chelating agents were added to the foods immediately before consumption. Iron absorption from all foods was decreased by desferrioxamine and phytate and increased by ascorbic acid (no increase from soybeans). These studies indicate that iron must be in a reduced soluble form during absorption, and imply that dietary composition and intestinal secretions are important determinants of dietary iron absorbability.

4725 **EFFECTS OF INTERACTION OF VARIOUS FOODS ON IRON ABSORPTION.** *(E.)* Layrisse, M. (Venezuelan Inst. Sci. Invest., Caracas), C. Martinez-Torres and M. Roche. *Amer J Clin Nutr* 21(10):1175-1183, 1968.

Preliminary information is presented on the absorbability of food iron from either vegetable (corn, black beans) or animal food (veal and fish muscle), separately or combined in the same meal; studies were carried out in 22 adult peasants (males and females) and 8 convicts (males). Iron absorption from veal combined with corn or black beans was less than that observed when veal was given alone. The decrease was less striking when veal was mixed with black beans, and corn did not inhibit iron absorption from fish. On the other hand, iron from corn or black beans was better absorbed when combined with food from animal origin than when given alone. Amino acids in the same number and proportion as are present in 100 g of fish muscle increased absorption of iron from black beans about 3-fold. These results indicate that the interaction of vegetable with animal food during digestion may change the pattern of iron absorption observed when these foods are given alone. A certain proportion of animal food should be included in the diet to enhance iron absorption from vegetable food.

4726 **IRON ABSORPTION FROM BREAD.** *(E.)* Callender, S. T. (Radcliffe Infirm., Oxford, England) and G. T. Warner. *Amer J Clin Nutr* 21(10):1170-1174, 1968.

In studies on 9 volunteers (1 man and 8 women, 27-83 yr old), some of whom had severe iron-deficiency anemia, there was little difference between the absorption of iron baked into bread (approximately 1 mg%) in the form of either ^{59}Fe-labeled "ferrum redactum" (powdered reduced iron) or ^{59}Fe-labeled ferric ammonium citrate; compared to the 11.3-50.5% absorption obtained for a standard 5-mg dose of ferrous sulfate plus ascorbic acid, 5 of the 9 subjects absorbed 1.6-5.2% of the ferrum redactum and 0-5.4% of the ferric ammonium citrate. Another 3 subjects showed essentially no iron absorption from any source, despite anemia (2 of these had hypochlorhydria and one had stomach cancer), and one subject absorbed 13.5% of the ferrum redactum and 18.3% of the ferric ammonium citrate. In 10 other volunteers (2 men and 8 women, 33-76 yr old), 9 of whom had normal gastric acidity, addition of orange juice containing approximately 50 mg of ascorbic acid per 100 ml to the bread containing labeled ferric ammonium citrate resulted in a significant increase in iron absorption (3.4-41.4% from bread compared to 10.0-97.0% from ferrous sulfate plus ascorbic acid and 0-18.3% from bread without orange juice). The effect of gastric acidity on iron absorption remains in doubt.

4727 **ABSORPTION OF IRON FROM BREAD.** *(E.)* Elwood, P. C. (Med. Res. Council, Cardiff, Wales), D. Newton, J. D. Eakins and D. A. Brown. *Amer J Clin Nutr* 21(10):1162-1169, 1968.

The availability of iron naturally present in white flour or wheat bran and iron added artificially in the form of ferric ammonium citrate was compared by a double radioactive isotope technique in 27 volunteers (7 men and 20 women) fed bread made from labeled flour. In addition, the effects of fruit juice and freshly boiled eggs on iron absorption were investigated. Bread was prepared either from Svenno white flour (71% extraction) which had been naturally labeled with ^{59}Fe by adding ^{59}FeCl$_3$ at the time of earing, from reconstituted whole-wheat flour consisting of normal white flour plus ^{59}Fe-labeled Svenno bran, or from normal white flour labeled with ^{55}Fe-ferric ammonium citrate. In the 7 women thought most likely to be iron deficient, feeding of white bread plus fruit juice resulted in 15.3% absorption of the ^{55}Fe from the ferric ammonium citrate and 19.2% absorption of the ^{59}Fe from the wheat flour. In the 20 other subjects, most of whom were probably not iron deficient, feeding of whole-wheat bread (with or without eggs and fruit juice) resulted in 0.3-5.4% absorption of the ^{55}Fe and 0.5-2.2% absorption of the ^{59}Fe. Fruit juice seemed to enhance the availability of administered iron while eggs markedly decreased it; however, these effects were much more marked on the absorption of ^{55}Fe from the added salt than on that of ^{59}Fe from the wheat. The total amount of iron available from bread made from white flour with added ferric ammonium citrate appears to be very close to that likely to be absorbed from whole-wheat bread.

4728 **CHOLESTEROL ABSORPTION USING CHROMIC OXIDE IN AN INDICATOR RATIO METHOD.** *(E.)* Rampone, A. J. (U. Oregon Med. Sch., Portland). *Amer J Physiol* 214(6):1370-1373, 1968.

Male Sprague-Dawley rats with established colostomies, fed 1 hr each day, were used to assess the nonsteady-state relation between gastrointestinal transit time and cholesterol-^{14}C absorption using chromic oxide as a nonabsorbable marker. Using 3 different diets (ground Purina chow; ground Purina chow with safflower seed oil added; ground Purina chow with commercial hydrogenated vegetable oil added), it was found that after single feedings chromic oxide and labeled cholesterol had similar transit times. The ratio of cholesterol-^{14}C to marker concentration in the feces expressed as a fraction of their ratio in the diets was used to estimate the amount of labeled cholesterol absorbed. With any 1 diet the ratios were constant within narrow limits in nearly all fecal samples containing marker. This indicates that cholesterol absorption may be reliably measured in the total intestine using only small stool samples and single feedings in nonsteady-state conditions. Using diets containing added fats, a slight increase in transit time occurred which was associated with a slight increase in cholesterol absorption compared to controls.

4729 **EFFECT OF SODIUM DESOXYCHOLATE ON THE INTESTINAL ABSORPTION AND LYMPHATIC TRANSPORT OF OLECIC ACID IN THE BILE FISTULA RAT.** *(E.)* Gallagher, N. D. (Royal Free Hosp. London, England), J. P. W. Webb and A. M. Dawson. *Gut* 9(5):561-563, 1968.

In male Sprague-Dawley rats with established bile fistulas, both the total absorption of intraduodenally administered ^{14}C-oleic acid and the proportion detected in the lymph were significantly decreased (to 47.7% and 21.1%, resp.) compared to controls (74.3% and 46.4%, resp.). However, the proportion of the lymph lipid accounted for by free fatty acids was increased from 1.7-5.7% to 18.0-38.1%. Oleic acid absorption was further depressed (to 35.7%) by simultaneous administration of sodium desoxycholate, but this increased the proportion recovered from the lymph (75.8%). This effect is probably not due to inhibition of esterification in the intestinal mucosa, since the absorbed fat was rerouted into the lymph and the proportion accounted for by free fatty acid returned towards normal (5.7-17.5%). These results make it unlikely that the presence of desoxycholate in the lumen of the small bowel of patients with the blind-loop syndrome causes steatorrhea by inhibiting the mucosal esterification of absorbed long-chain fatty acids.

4730 **ABSORPTION AND MALABSORPTION OF GLYCINE AND GLYCINE PEPTIDES IN MAN.** *(E.)* Craft, I. L. (Westminster Med. Sch., London, England), D. Geddes, C. W. Hyde, I. J. Wise and D. M. Matthews. *Gut* 9(4):425-437, 1968.

The glycine tolerance test and the absorption of glycylglycine and glycylglycylglycine were investigated under similar conditions in normal subjects and patients with an absent or nonfunctional pylorus (previous gastrectomy or vagotomy and pyloroplasty). Oral doses of free glycine or the peptides were followed by serial estimations of glycine and alpha-amino nitrogen in the peripheral plasma. The results demonstrated that when the peptides are given, they appear in the peripheral blood entirely as free glycine. However, a given quantity of glycine is more rapidly absorbed into the blood when administered as a small peptide than as the free amino acid. This is compatible with the view that hydrolysis of the peptides takes place within the cells of the intestinal mucosa and suggests that a rate limiting step in transport precedes hydrolysis. Glycine and glycylglycylglycine were absorbed more rapidly than normal in the absence of a functioning pylorus. Three of seven patients with idiopathic steatorrhea had extremely depressed tolerance curves after glycine and glycylglycine. Results in patients with Crohn's disease and proximal and distal intestinal resections indicated that the small intestine must be very extensively affected before absorption of glycine is obviously retarded. It is concluded that the glycine tolerance test is capable of giving useful information and that more extensive studies of the absorption of free amino acids and small peptides may contribute to the knowledge of intestinal absorption in health and disease.

4731 **ABSORPTION OF ^{212}Pb FROM THE GASTROINTESTINAL TRACT OF MAN.** *(E.)* Hursh, J. B. (U. Rochester Sch. Med., N. Y.) and J. Suomela. *Bioassay Anal. Chem. Mtg.* Proc. 13th Ann., Oct. 12-13, 1967. Lawrence Rad. Lab., Berkeley, Calif., 1968, UCRL-18140, pp. 217-233.

When the 24-hr urinary excretion of ^{212}Pb by 3 volunteers who received the isotope p.o. was compared with the average excretion in the same period by 2 subjects who received ^{212}Pb i.v., gastrointestinal absorption rates of 1.3%, 8.1% and 16.0% could be calculated. The only obvious factor related to the wide range in absorption was age, increasing age being associated with decreased absorption. The average value of 8% is the same as that used for lead by the ICRP-NCRP reports. It is pointed out that this choice may not be conservative for an appreciable fraction of the population. Changes in the ^{212}Pb concentration in the blood cells as a function of time suggest that loss may occur only after red cell death. The implications of this for the chemical toxicity of lead are discussed.

4732 **KINETIC PROBLEMS IN THE INTESTINAL ABSORPTION OF IRON: THE KINETICS OF INTESTINAL IRON ABSORPTION IN ANIMALS RENDERED SIDEROTIC AND SUBJECTED TO AN INTESTINAL IRON LOAD.** *(It.)* Cultrera, G. (Inst. Gen. Clin. Med., U. Pavia, Italy) and G. Robustelli della Cuna. *Hematologica* 52(8):657-661, 1967.

4733 **CONTROL OF IRON ABSORPTION BY INTESTINAL LUMINAL FACTORS.** *(E.)* Crosby, W. H. (New England Med. Ctr. Hosp., Boston, Mass.). *Amer J Clin Nutr* 21(10):1189-1193, 1968.

4734 **ABSORPTION OF INSULIN FROM THE HUMAN SMALL INTESTINE.** *(E.)* Crane, C. W. (Dept. Med., U. Birmingham, England) and G. R. W. N. Luntz. *Diabetes* 17(10):625-627, 1968.

4735 **THE MINIMUM DOSE OF X-RAYS ABLE TO ALTER *IN VIVO* INTESTINAL ABSORPTION OF GLUCOSE.** *(E.)* Lluch, M. (Dept. Physiol. Biochem., U. Navarra, Pamplona, Spain) and F. Ponz. *Rev Esp Fisiol* 24(3): 117-119, 1968.

4736 **RADIOPROTECTIVE ACTION OF CYSTEAMINE WITH RESPECT TO RADIATION PRODUCED ALTERATIONS IN THE INTESTINAL ABSORPTION OF GLUCOSE.** *(E.)* Lluch, M. (Dept. Physiol. Biochem., U. Navarra, Spain) and F. Ponz. *Rev Esp Fisiol* 24(3):147-148, 1968.

4737 **SPATIAL RELATIONSHIP BETWEEN INTESTINAL DISACCHARIDASES AND THE ACTIVE TRANSPORT SYSTEM FOR SUGARS.** *(E.)* Malathi, P. (Rutgers U. Med. Sch., New Brunswick, N. J.) and R. K. Crane. *Biochim Biophys Acta* 163(2):275-277, 1968.

4738 **THE PORTAL AND LYMPHATIC TRANSPORT OF PERSORBED FOOD PARTICLES.** *(Ger.)* Volkheimer, G. (Bayrischer Platz 9, Berlin, Germany). *Aktuel Gastroent* pp. 137-141. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

4739 **ROLE OF THE MICROVILLUS IN THE ABSORPTION OF DISACCHARIDES.** *(Rev.)* *(E.)* Hamilton, J. D. (St. Bartholomew's Hosp., London, England) and H. B. McMichael. *Lancet* 2(7560):154-157, 1968.

4740 HISTAMINE STIMULATION OF GASTRIC PEPSIN SECRETION IN THE DOG. *(E.)*

Thompson, J. C. (Harbor Gen. Hosp., Torrance, Calif.), W. D. Davidson, J. J. Patton and J. H. Miller. *Arch Surg* 97(5):805-808, 1968.

Acid and pepsin responses to prolonged i.v. administration of the gastrin-like pentapeptide (5 μg/kg/hr) and histamine (24 μg/kg/hr) were tested in 5 Heidenhain-pouch dogs and in 8 dogs with both Heidenhain pouches and innervated gastric fistulas. Both agents produced prolonged stimulation of acid and pepsin output from both types of pouches. At the end of the 8-hr histamine infusion, the pepsin secretory rate was greater than at 1 hr. The ratio of pepsin/acid secretion was higher with histamine than with pentagastrin. It is concluded that histamine, as used in this study, stimulates pepsin secretion in the dog.

4741 SECRETIN: THE ENTEROGASTRONE RELEASED BY ACID IN THE DUODENUM. *(E.)*

Johnson, L. R. (UCLA Sch. Med., Los Angeles, Calif.) and M. I. Grossman. *Amer J Physiol* 215(4):885-888, 1968.

Four dogs with Heidenhain pouches and gastric and duodenal fistulas were used to compare the inhibitory effects of i.v. infusions of secretin and intraduodenal infusions of HCl on gastric secretion. The duodenal infusate was 154 mM NaCl or 160 mM HCl; the i.v. infusate was 154 mM NaCl with or without added secretory stimulants and secretin. The intraduodenal infusion of HCl produced an 85% inhibition of pouch secretion stimulated by 0.4 g gastrin/kg/hr. Using the same stimulus, a physiological dose of secretin (4 U/kg/hr) caused complete inhibition of secretion. When secretion was stimulated with a near-maximal dose of gastrin, the same infusate of acid produced a 75% inhibition, while the same dose of secretin inhibited secretion 90%. Inhibition caused by secretin was thus again greater than that caused by acid. When the experiments were repeated using a dose of 0.04 mg histamine dihydrochloride/kg the responses to this dose of histamine and to a higher dose of gastrin were about equal. Neither the duodenal infusion of acid nor the i.v. infusion of secretin produced any inhibition of histamine-stimulated gastric secretion. It is concluded that secretin is probably the only enterogastrone released by acid in the duodenum.

4742 THE ANATOMIC BASIS FOR THE VARIABLE ADEQUACY OF INCOMPLETE VAGOTOMY: PART I: THE VARIOUS SECRETORY AND ULCEROGENIC POTENTIALS OF VARIOUS ANATOMIC TYPES OF INCOMPLETE VAGOTOMY IN SHAY RATS. *(E.)*

Legros, G. (U. Washington Sch. Med., Seattle) and C. A. Griffith. *Ann Surg* 168(6):1030-1034, 1968.

In pyloric-ligated rats, the secretory and ulcerogenic potential, or adequacy, of 2 anatomic types of incomplete vagotomy were compared: incomplete vagotomy of an intact trunk (residual innervation of the entire ipsilateral wall of the stomach) and incomplete vagotomy of the proximal anterior fundic branch (residual innervation of a small area in the proximal anterior fundus). In control groups, pyloric ligation without vagotomy resulted in ulcers in all rats, whereas complete vagotomy markedly reduced acid secretion and no ulcers developed. With incomplete vagotomy of an intact trunk, acid secretion was reduced but this reduction was inadequate protection for the prevention of ulcers in all rats. In contrast, with incomplete vagotomy as an intact fundic branch, the reduction of acid secretion was significantly greater and approximated that after complete vagotomy; the reduction of acid secretion was adequate and no ulcers developed. It is concluded that the adequacy of an incomplete vagotomy may be correlated with the area of residually innervated gastric mucosa which, in turn, may be correlated with the specific anatomic type of intact vagal fiber.

4743 THE ANATOMIC BASIS FOR THE VARIABLE ADEQUACY OF INCOMPLETE VAGOTOMY: PART II: THE VARIOUS RESPONSES TO INSULIN OF VARIOUS ANATOMIC TYPES OF INCOMPLETE VAGOTOMY IN DOGS. *(E.)*

Legros, G. (U. Washington Sch. Med., Seattle) and C. A. Griffith. *Ann Surg* 168(6):1035-1042, 1968.

Insulin tests were performed in dogs before and after 2 anatomic types of incomplete vagotomy: incomplete vagotomy of an intact vagal trunk (residual innervation of the ipsilateral wall of the stomach) and incomplete vagotomy of an intact proximal branch of the anterior gastric truncal division (residual innervation of a small area in the proximal anterior fundus). The dogs were equipped with a gastric cannula and a jejunal segment was interposed between stomach and duodenum permitting collections of clear gastric juice from the entire stomach uncontaminated by neutralizing duodenal reflux. Results before and after incomplete vagotomy of an intact trunk were virtually the same; the insulin response remained large in amount and early in onset. In contrast, the response after incomplete vagotomy of an intact fundic branch was significantly decreased and delayed. It is concluded that the secretion and ulcerogenic potential, or adequacy, of an incomplete vagotomy may be reflected by the amount and timing of the insulin response.

4744 CANINE PANCREATIC SECRETION IN RESPONSE TO ACCEPTABLE AND AVERSIVE TASTE STIMULI. *(E.)*

Behrman, H. R. (Sensory Physiol. Lab., North Carolina State U., Raleigh) and M. R. Kare. *Proc Soc Exp Biol Med* 129(2):343-346, 1968.

The effects of palatable and aversive food stimuli on pancreatic secretion were studied in an adult male and a spayed female dog. The stimuli consisted of water and aqueous solutions of sucrose, citric acid, and quinine mixed with a portion of the basal diet. Results indicated that both pancreatic flow and pancreatic protein output can be affected by the nature of the taste stimuli. Water and a sucrose solution mixed with a basal diet produced a similar and significantly greater stimulation of flow than did citric acid or quinine, which in turn were similar. Although it appeared that protein secretion was more strongly enhanced by sucrose solution than by water and solutions of citric acid and quinine, it could not be clearly established that sucrose solution and water were really different. The flow responses for the 4 taste stimuli were highly correlated with the readiness with which the various food mixtures were accepted by the conscious dogs.

SECRETION

4745 **THE MAXIMAL OSMOTIC CONCENTRATION OF THE GASTRIC JUICE: A CONTRIBUTION TO THE PROBLEM OF THE MECHANISM OF GASTRIC SECRETION.** *(Ger.)* Mertz, D. P. (Med . Polyclin., U. Freiburg i. Br., Germany), W. Poppe and G. Poser. *Klin Wschr* 46(2): 85-93, 1968.

Changes in the ionic composition, osmolality and volume-rate of gastric secretion during maximal continuous acid stimulation (Histalog, 2 mg/kg/hr i.v.) and with the simultaneous administration of atropine (0.5 mg i.v.) were investigated in 19 fasting subjects (16 males and 3 females, 15-49 yr old) who were also subjected to gastric biopsy. Although the gastric mucosa was normal in 15 cases, 1 had superficial gastritis and 3 had mild chronic gastritis (associated in 1 case with gallbladder disease). The ratio of the osmotic concentration of the gastric juice to that of the plasma increased with stimulation from an average resting value of 0.66 ± 0.1 to 0.98 ± 0.07. Despite the relatively high acid output, the maximum ratio observed was 1.03 so that hyperosmotic gastric juice was not produced under these conditions. The normal steady-state secretion under Histalog stimulation (2-hr test period) was 286.8 ± 75.6 ml of gastric juice per hour, containing 34.8 ± 9.6 mEq H^+ and 42.6 ± 10.8 mEq Cl^-. In comparison with the basal secretion, Histalog thus produced a highly significant increase in the concentration of both H^+ and Cl^-, while the concentrations of Na^+, Ca^{++} and Mg^{++} fell significantly and that of K^+ remained essentially unchanged. The effect of Histalog on H^+ and Cl^- secretion was potentiated by atropine, which also decreased the secretion of Na^+ and Ca^{++} while increasing the osmolality of the gastric juice to a maximum gastric juice/plasma ratio of 1.12. These findings are not compatible with the back-diffusion theory of Teorell and tend to confirm the two-component hypothesis of Hollander, with the exception that the electrolyte composition of the alkaline nonparietal component is by no means identical to that of the interstitial fluid.

4746 **STUDIES ON GASTRIC SECRETION FOLLOWING STIMULATION WITH PENTAGASTRIN (ICI 50 123).** *(Ger.)* Kaess, H. (Med. Clin., U. Heidelberg, Germany), R. Gugler and M. Eichelbaum. *Klin Wschr* 46(2): 93-97, 1968.

Gastric secretion following i.v. and s.c. pentagastrin was followed in 2 normal subjects and in 10 patients with ulcers and/or gastritis who were also tested with Histalog (1.5 mg/kg s.c.). By the i.v. route in normal subjects, a dose-response relation was obtained for gastric acid secretion at pentagastrin doses of 0.6-6.0 μg/kg/hr; higher doses were poorly tolerated and produced very little increase in acid output. The electrolyte composition and volume of the gastric juice varied in accordance with the acid concentration, as previously observed following histamine stimulation. Given to ulcer and gastritis patients by the s.c. route, pentagastrin (6.0 μg/kg) yielded a time-course of acid secretion resembling that after histamine, with a maximum in 20-30 min and a gradual decline which varied with the patient. The average maximal acid output after pentagastrin was 89% of that after s.c. Histalog (1.5 mg/kg), but in some cases there were marked differences in response to the two agents, the reasons for which remain unclear. In 2 cases, acid secretion was greater after pentagastrin than after Histalog, while in other cases the reverse was true and in 1 case acid secretion could be elicited only by Histalog. Side effects (nausea and vomiting) were negligible after i.v. pentagastrin and were temporary, although more pronounced, after s.c. pentagastrin. It is concluded that i.v. pentagastrin is a suitable stimulus for clinical studies of gastric secretion.

4747 **PARTIAL NEUTRALIZATION OF A HYDROCHLORIC ACID SOLUTION IN A HEIDENHAIN POUCH.** *(Ger.)* Lick, R. F. (Surg. Polyclin., U. Munich, Germany), W. Hart, G. Hildenbrand, D. Balser and F. Riffelmacher. *Z Gastroent* 6(4):271-278, 1968.

In 4 previously prepared dogs, vagally-denervated Heidenhain pouches were filled with aqueous isotonic solutions of HCl (155 mEq or 295 milliosmoles per liter) containing 40 mg/liter of phenol red, and the volume, phenol red concentration, osmolality and electrolyte concentration (H^+, Na^+, K^+, and Cl^-) were determined over waiting periods of 0.5-5.0 hours. With time, the volume of fluid in the pouch gradually increased from an average of 55 ml initially to 65.7 ml after 5 hr; correspondingly, the phenol red concentration decreased to 76.4% of the initial value and the osmolality decreased to 259 milliosmoles/kg H_2O. During the same period, the H^+ concentration decreased from 155 to 89.4 mEq/liter, which represented a decrease from 8.53 to 6.07 mEq of hydrogen ions; this is a greater decrease than could be accounted for by either dilution or the entry of bicarbonate ions (estimated to equal about 0.32 mEq). As the acidity decreased, 2.95 mEq of Na^+ and 0.13 mEq of K^+ entered the pouch, resulting in a final sodium and potassium concentration of 43.3 and 1.97 mEq/liter, resp., while the chloride concentration decreased less than would be accounted for by dilution. Whereas most of these changes were partially prevented by atropine (0.025 mg/kg i.v.), the decrease in chloride was more pronounced after this agent. At least some of the decrease in acidity must be ascribed to back-diffusion of H^+ ions in exchange for Na^+, thus confirming previous findings in Shay rats and the original hypothesis put forward by Teorell in 1947. The partial neutralization of secreted HCl by the resting stomach can be looked upon as an additional protective mechanism preventing autodigestion of the mucosa. Since this process is partly inhibited by atropine, the latter is unsuitable for the treatment of hyperacidity.

4748 **DEMONSTRATION OF THE VAGAL-ANTRAL INHIBITION OF THE GASTRIN MECHANISM IN ANIMAL EXPERIMENTS.** *(Ger.)* Hart, W. (Surg. Polyclin., U. Munich, Germany), K. H. Welsch, J. Klempa and W. Schützler. *Z Gastroent* 6(4):257-265, 1968.

Four male dogs with vagally denervated Heidenhain (fundic) pouches were subjected to a selective vagotomy which completely denervated the parietal-cell region, as well as the corpus and the cranial duodenum, while sparing the antral branches of the anterior and posterior vagi. Electrodes were then applied to the antral branches to permit electrostimulation of the antrum at will. Whereas exposure to a meat meal resulted in an average output of 13 ml of gastric juice (1.232 mEq acid) from the Heidenhain pouch during the 1st hr under control conditions, this was decreased to 5.10 ml (0.367 mEq acid) when similar exposure was accompanied by electrostimulation of the antrum (18 pulses/minute, each lasting 1 millisecond, at an increasing current strength of 6-18 mA). This inhibitory effect (amounting to 26-70%) was only manifested during the 1st 2 hr of each experiment, while during the 3rd-5th hr the secretion was comparable to that under control conditions. Gastric secretion in response to a meat meal was markedly increased (to 14.6 ml containing 1.855 mEq of acid during the 1st hr) after electrocautery of the remaining branches of the vagus. This increase, which amounted to 186-405% during the 1st hr compared to the output during electrical stimulation of the antrum and 12.3-50.5% during the 1st hr compared to the output under control conditions, persisted for the 1st 3 hr of each 5-hr experiment. These results confirm the previous clinical finding that vagal stimulation of the antrum inhibits gastrin-stimulated gastric secretion in the empty stomach, and indicate strongly, contrary to the views of Harkins and Nyhus, that the vagal innervation of the antrum should be preserved during vagotomy for peptic ulcer whenever the antrum itself is preserved.

4749 COMPARISON OF STIMULANTS OF ANTRAL RELEASE OF GASTRIN. *(E.)* Cooke, A. R. (UCLA Sch. Med., Los Angeles, Calif.) and M. I. Grossman. *Amer J Physiol* 215(2):314-317, 1968.

In 3 fasted dogs with transplanted and extrinsically denervated antral pouches, gastric fistulas, and Heidenhain pouches, acid output in response to antral-pouch distention with a balloon containing 10 ml of water and to antral-pouch perfusion with solutions of acetylcholine chloride (0.2%), ethanol, meat extracts, glycine (0.25 M), sodium chloride (0.15 M), and sodium bicarbonate (0.15 M) at 90 ml/hr was compared with the maximal response to i.v. histamine. Gastric juice was collected every 15 min. The volume of each sample was recorded to the nearest 0.1 ml and the concentration of acid was determined by titration of a 0.2 ml sample of juice to pH 7 against 0.2 N NaOH using a glass electrode and an automatic titrator. Acetylcholine chloride was the most powerful stimulant of acid output from the gastric fistula. Ethanol and meat extracts were weak stimulants and isotonic solutions of sodium chloride and sodium bicarbonate failed to stimulate acid secretion. Acid output from the Heidenhain pouch was negligible in response to all stimulants except acetylcholine irrigating the antral pouch or histamine given intravenously. Perfusion with glycine produced only a slight response. Balloon distention of the antral pouch was a weak but effective stimulant of acid secretion from the gastric fistulas.

4750 RESPONSE OF THE CANINE PANCREAS TO DUODENAL ACIDIFICATION AND SECRETIN. *(E.)* Pascal, J. P. (Purpan Hosp., Toulouse, France), N. Vaysse, D. Augier and A. Ribet. *Scand J Gastroent* 3(4):444-448, 1968.

In experiments on 6 dogs with cannulated pancreatic ducts, the volume flow and bicarbonate output of the pancreatic juice were found to be directly related to the rate of infusion of HCl into the duodenum. No dissociation between anionic secretion and volume flow could be obtained by means of duodenal acidification. In most dogs, a maximal pancreatic response was obtained with 12 mEq acid/30 min. This figure closely corresponds to the maximal capacity of gastric acid secretion of the dog. The relation between acid infusion rates and an approximate estimate of the amounts of circulating endogenous secretin show the characteristic pattern of a pharmacological dose-response curve. Under physiological conditions, the limiting factor in pancreatic secretion is the maximal capacity of the intestine to release secretin.

4751 EFFECT OF FEEDING ON ANTRAL AND DUODENAL GASTRIN ACTIVITY. *(E.)* Fyrö, B. (Dept. Pharmacol., Karolinska Inst., Stockholm, Sweden). *Acta Physiol Scand* 74(1/2):166-172, 1968.

Antral and duodenal gastrin activity was determined in a total of 58 cats killed 1.5, 3, 6, 12, 24, 48 or 96 hr after eating 200 g of raw fish. Cats killed 24 hr after feeding were used as controls, while those killed at 48-96 hr were given 5 g glucose s.c. daily. Vagotomized cats were killed 3 hr after the meal. Mucosal specimens were prepared from the stomach and duodenum immediately after death. Gastrin was extracted by the method of Komarov, and the secretory activity of each extract was assayed on 4 nonanesthetized gastric-fistula cats. At 1.5 and 3 hr after feeding, the antral gastrin activity was reduced to 40% of control values. At 6 hr there was a trend towards restoration and after 12 hr antral gastrin activity had returned to normal. Starvation for either 2 or 4 days did not influence the antral gastrin activity. The duodenal gastrin activity was 60% of control values 3 hr after feeding. Vagotomy did not influence the reduction in gastrin activity 3 hr after feeding.

4752 ACTION OF PANCREOZYMIN PREPARATIONS ON GASTRIC ACID SECRETION. *(E.)* Nakamura, M. (Creighton U. Sch. Med., Omaha, Neb.), S. Nakajima and D. F. Magee. *Gut* 9(4):405-410, 1968.

In 15 dogs with simple gastric fistulas, innervated fundic pouches, or denervated antral and fundic double pouches, it was found that pancreozymin (0.125-1.0 U/min) and methacholine (1-8 μg/min) given together produced greater gastric acid secretion than the sum of their separate responses. As the dose of methacholine was increased above 2 μg/min potentiation disappeared. On the other hand, pancreozymin depressed the gastric acid response to synthetic gastrin pentapeptide, histamine, endogenous antral gastrin, or feeding. These results lend support to the theory that pancreozymin either is or contains enterogastrone.

4753 THE ISOLATION AND CHEMISTRY OF SECRETIN AND CHOLECYSTOKININ. *(E.)* Jorpes, J. E. (Dept. Chem., Karolinska Inst., Stockholm, Sweden). *Gastroenterology* 55(2):157-164, 1968.

4754 ACID SECRETION IN *CYPRAEA*. *(E.)* Kniffen, J. C. (U. Florida Coll. Med., Gainesville). *Amer J Dig Dis* 13(9):775-778, 1968.

4755 GASTRIN AND ITS SIGNIFICANCE. *(Rev.)(E.)* Classen, M. (Med. Dept., U. Erlangen-Nürnberg, Germany). *Digestion* 1(2):120-124, 1968.

4756 FAILURE OF "ANTIGASTRIN" (SC-15396) TO INHIBIT GASTRIC ACID AND PEPSIN SECRETION IN ANAESTHETIZED GASTRIC FISTULA CATS. *(E.)* Sewing, K. F. (Dept. Pharmacol., U. Tubingen, Germany), P. D. Gorinsky and F. Lembeck. *Naunyn Schmiedeberg Arch Pharm Exp Path* 261(1):89-92, 1968.

4757 SITE FOR THE SECRETION OF GASTRIC LIPASE IN THE GLANDULAR SYSTEM OF THE CANINE GASTRIC MUCOSA. *(It.)* Clementi, A. (Inst. Human Physiol., U. Catania, Italy), A. Urbano and A. Cambria. *Boll Soc Ital Biol Sper* 44(8):802-804, 1968.

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4758 THE EFFECT OF SURGICAL VAGOTOMY ON GASTRIC SECRETION INDUCED BY PENTAGASTRIN OR HISTAMINE. *(Pol.)* Konturek, S. (1st Clin. Int. Dis., Acad. Med., Krakow, Poland), A. Wysocki and K. Moczurad. *Pol Tyg Lek* 23(43):1634-1637, 1968.

4759 A NEW TECHNIQUE FOR THE CREATION OF AN ISOLATED GASTRIC POUCH IN THE RABBIT. *(Fr.)* Beauville, M. (Inst. Physiol., Toulouse, France), P. Raynaud and C. Bressou. *C R Acad Sci [D] (Paris)* 267(14): 1153-1156, 1968.

4760 CENTRAL NERVOUS SYSTEM INFLUENCES ON PANCREATIC SECRETION, SPHINCTERIC MECHANISMS, AND BLOOD FLOW AND THEIR ROLE IN THE COURSE OF PANCREATITIS. *(E.)* Gilsdorf, R. B. (U. Minnesota Hosp., Minneapolis), L. F. Urdaneta, J. P. Delaney and A. S. Leonard. *Surgery* 62(4):581-588, 1967.

4761 A CORRELATION OF PARIETAL CELL ACTIVITY WITH ULTRASTRUCTURAL ALTERATIONS. *(E.)* Adkins, R. B. Jr. (Vanderbilt U. Sch. Med., Nashville, Tenn.), N. Ende and W. G. Gobbel Jr. *Surgery* 62(6):1059-1069, 1967.

4762 THE EFFECT OF SECRETION AND PANCREOZYMIN ON THE CAPILLARY CIRCULATION OF THE EXOCRINE PANCREAS. *(Ger.)* Heisig, N. (1st Med. Clin., U. Hamburg, Germany). *Aktuel Gastroent* pp. 101-103. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis. Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

4763 INTERDEPENDENCY BETWEEN THE CONCENTRATIONS OF POTASSIUM, SODIUM AND CHLORINE IN THE SERIUM AND GASTRIC JUICE FOLLOWING INJECTION OF HISTAMINE. *(Ger.)* Gross, W. (Med. Polycin., U Wurzburg, Germany). *Aktuel Gastroent* pp. 310-311. [Proc. 24th Meeting German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

4764 STUDIES ON SOME QUATERNARY COMPOUNDS WITH AN INHIBITORY EFFECT ON THE GASTRIC SECRETION OF RATS. *(E.)* Antonsen, S. (Dept. Pharmacol., Alfred Benzon Ltd., Copenhagen, Denmark). *Acta Pharmacol (Kobenhavn)* 26(Suppl 2):7-61, 1968.

4765 PENTAGASTRIN AS A GASTRIC SECRETORY STIMULANT. *(E.)* Schmidt, G. (Prince Henry's Hosp., Melbourne, Australia), R. A. Petersen, M. Roszbach and J. Hansky. *Med J Aust* 2(14):580-582, 1968.

See also abstract nos.: 4718,5215

4766 **MYOGENIC TRANSMISSION OF ANTRAL SLOW WAVES ACROSS THE GASTRODUODENAL JUNCTION *IN SITU*.** *(E.)* Bortoff, A. (Upstate Med. Ctr., Syracuse, N. Y.) and R. S. Davis. *Amer J Physiol* 215(4): 889-897, 1968.

A total of 29 animals, including 18 cats, 5 dogs, 3 baboons, and 3 rhesus monkeys, was used in these *in vivo* experiments to determine whether or not junctional transmission of antral slow waves could be demonstrated, to study the effect of myenteric denervation on antral slow wave transmission, and to observe the effects of vagal and splanchnic nerve stimulation on transmission of antral slow waves. Antral slow waves consisted typically of an initial fast depolarization followed by a slower more prolonged depolarization. Antral slow waves were more labile than their duodenal counterparts. They were affected by vagal or splanchnic stimulation and also by anoxia. Since antral slow waves spread into the duodenum after effective denervation of the junction, their transmission is basically a myogenic process. In all animals studied, vagal stimulation increased both the amplitude of the second component of antral slow waves and the extent to which duodenal slow waves were augmented. Duodenal spiking was temporally related to the antral slow waves. Splanchnic stimulation produced both atropine-sensitive excitation and inhibition of the antral slow waves. The spread of antral slow waves into the proximal duodenum is believed to constitute the primary integrative mechanism for coordination of mechanical activity during gastric emptying.

4767 **A BASIS FOR ELECTRICAL STIMULATION FOR ANAL CONTINENCE.** *(E.)* Collins, C. D. (Royal Infirm., Sheffield, England), B. H. Brown and H. L. Duthie. *Scand J Gastroent* 3(4):395-400, 1968.

In 7 normal subjects, radial force was recorded from the anal canal during electrical stimulation from an intraluminal plug to determine the most efficient way of stimulating the anal sphincter muscles in terms of electrical pulse width, frequency, and current strength. The experiments were repeated in 7 more patients after the induction of light general anesthesia and after complete muscle relaxation with gallamine triethoxide (Flaxedil). A pulse 1 msec in width, at 20 cycles/second and 3 ma, was found to provide the minimal effective stimulation. Whereas the force fell off rapidly when a continuous stimulus was used, by applying stimulation at intervals of 20 sec for periods of 10 sec, reproducible force responses were obtained each time the stimulus was applied. Such a stimulator system is currently being used in incontinent patients.

4768 **BASAL ELECTRICAL ACTIVITY IN THE ANAL CANAL IN MAN.** *(E.)* Wankling, W. J. (Royal Infirm., Sheffield, England), B. H. Brown, C. D. Collins and H. L. Duthie. *Gut* 9(4):457-460, 1968.

Electrical activity and radial force in the anal canal were recorded simultaneously in 20 normal men (20-55 yr old) using bipolar intraluminal electrodes. Slow or basal electrical activity was recorded in all subjects resting on the left side, at a mean frequency of 16.4/min. An ultraslow wave form was noted in 14 of the 20 subjects at a mean frequency of 1.6/min. A similar pattern of waves was shown on the force recording: slow 16.9/min and ultraslow 1.3/min, but the electrical and force wave activities were not always in phase. Paralysis of the external anal sphincter did not significantly alter the characteristics of electrical or force waves.

4769 **GASTRIC EMPTYING RATE OF THE WATER AND FAT PHASES OF A MIXED TEST MEAL IN MAN.** *(E.)* Chang, C. A. (McGill U. Clin., Royal Victoria Hosp., Montreal, P. Q., Canada), R. D. McKenna and I. T. Beck. *Gut* 9(4):420-424, 1968.

The passage through the pylorus of fat and water-soluble components of various mixed meals was studied during 70 experiments in 10 healthy volunteers (aged 18 to 26 yr). The subjects were intubated and the test meal was administered through a Levine tube. Gastric contents were withdrawn 30 min later and the stomach was washed out twice to recover the total residue. Pyloric passage of the fat component was determined by the recovery of fat from the stomach. The passage of water-soluble substances was measured by Hunt's technique. With the subjects in the sitting position, pyloric passage of the water phase in 30 min was unchanged by the addition of fat to the water phase of the meal: the water phase passed freely through the pylorus, but the entire fat phase was retained by the stomach for the 30 min period. With the subjects in the left lateral recumbent position, the pyloric passage of fat was significantly increased and that of water was reduced. In the right lateral recumbent position, fat did not pass the pylorus but greater amounts of water passed than in the sitting position. Water and fat apparently separate in the stomach, and due to their different specific gravities, body position has an important effect on their differential passage through the pylorus.

4770 **COLONIC MOTOR ACTIVITY AND BOWEL FUNCTION. PART I. NORMAL MOVEMENT OF CONTENTS.** *(E.)* Ritchie, J. A. (Nuffield Inst. Med. Res., Oxford, England). *Gut* 9(4):442-456, 1968.

Time-lapse cinefluorography at 1-min intervals over a period of 1 hr was used to study the character and incidence of colonic motility in 193 human volunteers at rest and after food, and after injection of carbachol (0.25 mg i.m.). Movements of a barium sulfate suspension ingested 12-24 hr earlier were divided into propulsive and nonpropulsive categories. Nonpropulsive segmental movements were the only form of motor activity seen in 38% of subjects at rest; propulsive movements were seen at some time during the hour of study in 62% of subjects at rest, and in 87% after food and carbachol. Normal colonic contents were transported in either direction between 30 and 100 times more slowly than liquids and gas.

4771 **EFFECT OF FEEDING ON GASTRIC AND OESOPHAGEAL PRESSURES IN THE NEWBORN.** *(E.)* Barrie, H. (Charing Cross Hosp., London, England) *Lancet* 2(7579):1158-1160, 1968.

Gastric and esophageal pressures were recorded in 18 healthy infants (2 hr to 6 weeks old) before and after feeding of reconstituted milk (40-80 ml/kg at a rate of 20 ml/min with 5-min intervals) via nasogastric tube. All infants regurgitated milk into the lower half of the esophagus (15-70 ml being recovered), and in many, altered or abnormal patterns of breathing developed. Gastric pressure usually rose by 5-10 cm H_2O, with a gradual return to the resting pressure (4-12 cm H_2O) during the next minute. Peristaltic activity tended to diminish as the stomach filled. When early feeding is desirable to reduce hypoglycemia and jaundice, such feedings should be given cautiously and with particular reference to possible dyspnea and regurgitation.

4772 GASTRIC EMPTYING AND PROPULSIVE INTESTINAL MOTILITY IN EXPERIMENTAL INTESTINAL OBSTRUCTION.

(E.) Nylander, G. (Dept. Exp. Surg., Acad. Hosp., Uppsala, Sweden) and A. Svensson. *Acta Chir Scand* 134(2):135-145, 1968.

Gastric emptying and the propulsive motility of the distally ligated small intestine of the rat were recorded and compared with these functions in both an intact and a laparotomized control series. Intestinal obstruction was allowed to persist for 24 or 72 hr. The quantitative distribution of radioactive chromate in the gastrointestinal tract was recorded at intervals 15-60 min after its deposition in the stomach. The weight of the stomach and the obstructed intestine were also determined. After only 24 hr, simple intestinal obstruction led to marked retardation of gastric emptying, and the distal propagation of the test dose in the obstructed small intestine was correspondingly retarded. After 72 hr, the emptying of the stomach had not been further inhibited and may have been accelerated. However, distal propagation of the evacuated portion was less marked. In the laparotomized group, both gastric emptying and the distal propagation of the evacuated portion in the small intestine were retarded at 24 hr. These effects were still present at 72 hr but to a lesser degree. The effect on gastric emptying was much more marked in the group with intestinal obstruction than in the intact or laparotomized group.

4773 THE MOTILITY RESPONSES OF ANTRAL POUCHES TO ELECTRICAL STIMULATION BEFORE AND AFTER VAGAL DENERVATION IN THE CAT.

(E.) Inberg, K. R. (Dept. Surg., U. Helsinki, Finland), C. Möller, S. Ryöppy and E. Koskela. *Acta Chir Scand* 134(6): 441-446, 1968.

In 27 cats, the motility response of the isolated antrum and pylorus to electrical vagal stimulation was determined before and after vagal denervation and compared with the motor activity of the body and fundus. The upper part of the stomach responded to electrical stimulation with weak contractions, while the antrum and pylorus responded with vigorous contractions. The only source of vagus innervation of the antral pouch was from branches running extramurally in the lesser omentum and, presumably, deriving from the hepatic branches, hepatic plexus, or directly from the anterior vagus. Preserving the hepatic branches and distal part of the lesser omentum preserved the motor activity of the antrum after anterior selective vagotomy, but in some of the experiments the antral response was markedly decreased. Based on these findings, a modified technique was developed for proximal denervation by means of bilateral selective vagotomy combined with pyloroplasty and preservation of the gastric antrum.

4774 CORRELATION OF SEVERAL METHODS FOR RECORDING ESOPHAGEAL SPHINCTERAL PRESSURES.

(E.) Rinaldo, J. A. Jr. (Mt. Carmel Mercy Hosp., Detroit, Mich.) and J. F. Levey. *Amer J Dig Dis* 13(10):882-890, 1968.

Three water-filled latex balloons with diameters of 0.4, 0.6 and 0.8 cm, resp. attached to polyvinyl tubes were used to record pressures in the inferior and superior esophageal sphincters of 21 healthy subjects. The balloons were pulled through the sphincters continuously. In 12 of the 21 subjects, the studies were repeated using a constantly perfused, open-lumen, vinyl tube with 3 openings 5 cm apart. The distal 2 openings were in the fundus of the stomach, and the tube was withdrawn at 1-cm intervals through the inferior sphincter, the body of the esophagus and the superior sphincter. The studies were repeated a 3rd time in the same subjects, using the open-tip method and a continuous rather than an intermittent pull-through technique. Pressures in the inferior sphincter varied with balloon size and respiration, but not with the rates of perfusion or the lumen size. Pressures in the superior sphincter varied with balloon size, respiration, perfusion rate, and lumen size. However, comparable results were obtained with the different systems under appropriate conditions.

4775 COLONIC MOTOR ACTIVITY AND BOWEL FUNCTION. PART II. DISTRIBUTION AND INCIDENCE OF MOTOR ACTIVITY AT REST AND AFTER FOOD AND CARBACHOL.

(E.) Ritchie, J. A. (Radcliffe Infirm., Oxford, England). *Gut* 9(5):502-511, 1968.

Colonic motor activity at rest, after food and following i.m. injection of carbachol was examined by time-lapse cinefluorography in 193 volunteers 12-24 hr after the ingestion of barium sulfate suspension. Functionally, 64% were said to be normal with 1 daily bowel movement, 26% were inclined to diarrhea, and 10% to constipation. Barium reached the rectum within 12-15 hr in 56% of the normal subjects. The average net propulsion of colonic contents in normal subjects was 5.8 cm/hr under resting conditions and was slightly diminished after lunch. In constipated subjects, net propulsion at rest was 0.9 cm/hr; too few had barium visible in the distal colon to evaluate the effects of food in this group. Net colonic propulsion in diarrheic subjects under resting conditions was 4.9 cm/hr and increased to 16.6 cm/hr after lunch. Carbachol increased coordinated propulsion 4-fold in the normal group of subjects, and 10-fold in those with abnormal bowel function, whether diarrheic or constipated.

4776 CHOLECYSTOKINETIC POTENCY OF GASTROINTESTINAL HORMONES AND RELATED PEPTIDES.

(E.) Vagne, M. (UCLA Sch. Med., Los Angeles, Calif.) and M. I. Grossman. *Amer J Physiol* 215(4):881-884, 1968.

The cholecystokinetic potency of several peptides with the same C-terminal sequence (tryptophan-methionine-aspartic acid-phenylalanine-NH_2) as cholecystokinin-pancreozymin (CCK) was studied in 7 conscious dogs prepared by double ligation and transsection of the cystic duct and cannulation of the gallbladder. Porcine CCK (0.05, 0.10, 0.20 and 0.40 U/kg) was given i.v. and used as a reference standard. The potency of gastrin I and gastrin II (0.125, 0.25, 0.5, 1.0 and 2.0 μg/kg) was about 1/12th that of CCK on a weight basis and about 1/22nd on a molar basis. Tetrapeptide and pentapeptide (0.5, 1.0 and 2.0 μg/kg) had similar potencies (1/143rd that of CCK). Caerulein (0.5, 1.0 and 2.0 ng/kg) was 47 times as potent as CCK on a weight basis and 16 times as potent on a molar basis. It is clear that the potency of these peptides is influenced by amino acids other than the C-terminal ones.

4777 **STUDY OF LARGE BOWEL PERISTALSIS.** *(E.)* Hardcastle, J. D. (London Hosp., England) and C. V. Mann. *Gut* 9(5):512-520, 1968.

Spontaneous colonic and rectal peristalsis was studied in human subjects by intraluminal balloon kymography and cineradiology and compared with peristalsis stimulated by bisacodyl and oxyphenisatin. Spontaneous peristalsis occurred infrequently in the colon, but a similar type of activity was regularly produced by the drugs. The peristaltic wave was always directed toward the rectum, at an average speed of 25 cm/min. The peristaltic response was repetitive and did not pass across a loop colostomy. Responses to bisacodyl were blocked by prior but not subsequent application of lignocaine. Peristalsis could be induced in sensitized colon by nonspecific stimuli, but it did not occur in the rectum.

4778 **EFFECTS OF ETHYL ALCOHOL ON SPHINCTERIC RESISTANCE AT THE CHOLEDOCHODUODENAL JUNCTION IN MAN.** *(E.)* Pirola, R. C. (Sch. Med., U. New South Wales, Sydney, Australia) and A. E. Davis. *Gut* 9(5):557-560, 1968.

The effects of i.v. alcohol (300-900 mg/kg as a 10% solution in 5% glucose) on common bile duct pressures were studied in 10 cholecystectomized and choledochotomized patients. Increases in pressure were similar to those obtained with morphine (average of 4.4 and 7.6 cm saline or 33 and 64%, resp.). Biopsy specimens of the duodenal mucosa from 5 patients with chronic alcoholism in an active phase revealed no evidence of duodenitis. It is postulated that alcohol causes increased tone in the sphincteric mechanism at the choledochoduodenal junction, and that this effect, which is related to the level of alcohol in the blood, may be responsible for the biliary obstruction which contributes to the development of alcoholic pancreatitis.

4779 **EFFECTS OF HYOSCINE BUTYLBROMIDE ON GUT MOTILITY.** *(E.)* Guignard, J. P. (London Hosp. Med. Coll., England), A. Herxheimer and R. M. Greenwood. *Clin Pharmacol Ther* 9(6):745-748, 1968.

The effect of intravenous and oral hyoscine butylbromide (HBB) on gut motility was studied by tape recording bowel sounds in 7 healthy volunteers (4 men and 3 women, 20-23 yr old), using a double-blind procedure. In 6 subjects, i.v. administration of 8 mg of HBB reduced the bowel sounds for 15-30 min followed by a considerable increase in bowel sounds. Oral administration of 200 mg HBB to the same 6 subjects had no effect on bowel sounds for periods up to 3 hr. In the 7th subject, increases in bowel sounds occurred promptly after both i.v. and oral HBB. These results indicate that HBB is poorly absorbed from the gut and has little, if any, effect on the normal bowel when given orally.

4780 **INHIBITORY ACTION OF FORMAMIDE ON SMOOTH MUSCLE CONTRACTION.** *(E.)* Córdoba, F. (Sch. Med., San Juan, Puerto Rico), S. Schoof, S. Vélez and J. del Castillo. *Life Sci* 7(17):897-903, 1968.

In vitro studies on guinea-pig ileum using 0.4 M formamide revealed a 90% reduction in the amplitude of the ileal contraction elicited by 0.1 μg/ml of histamine. This effect was reversible in that the response to histamine returned to its initial amplitude when the formamide was removed by washing the preparation with fresh Kreb's solution. A blocking effect of formamide on contracture could be elicited by increasing the external potassium concentration from 5.9 to 95 mM. Following the addition of Ca^{++} ions, still in the presence of formamide, the amplitude of the contraction was increased from 10% to 50% of the control value. Yet, the same concentration of Ca^{++} ions had no significant effect on the response to acetylcholine in the absence of formamide. When the concentration of Mg^{++} ions in the solution was increased, the effect of formamide was slightly potentiated. The results suggest that formamide acts by activating the relaxing mechanisms of the muscle cells.

4781 **THE EFFECT OF HYPOXIA ON THE MECHANICAL ACTIVITY OF THE CANINE SMALL INTESTINE.** *(E.)* Szurszewski, J. (Dept. Physiol. Biophys., U. Illinois, Urbana) and F. R. Steggerda. *Amer J Dig Dis* 13(2):178-185, 1968.

The effects of 4 hr of hypoxia on the contractile activity of intact jejunal segments were determined by means of chronically implanted, extraluminal force transducers in 8 healthy, unanesthetized, female begale dogs. The dogs were killed and autopsied 21-28 days after surgery and histological sections from the normal and perfused intestinal segments were studied. In normal segments orad to the hypoxic segment, the time distribution on an hourly basis for the basal, burst, and intermediate patterns in the transverse axes was 33, 8, and 19 min, resp., and the patterns of contraction in the transverse and longitudinal muscle layers at any given time were the same. In the hypoxic segment, the corresponding time distribution was 30, 19, and 11 min, resp., and the 2 muscle layers were usually asynchronous. The frequency of contraction of the longitudinal and transverse axes in the hypoxic segment was less than that in normal segments. Although spikes initiate contraction, the slow-wave frequency determines the maximal contractile frequency of both muscle layers. Histologically, no necrosis of muscle layers was observed and the amount of connective tissue in the hypoxic segment was minimal. It is felt that the myenteric plexus synchronizes the contractile patterns between muscle layers, coordinates contractile activity between adjacent intestinal segments, and regulates the level of intestinal tone.

4782 **PROPULSIVE GASTROINTESTINAL MOTILITY IN REGIONAL AND GRADED ISCHEMIA OF THE SMALL BOWEL. AN EXPERIMENTAL STUDY IN THE RAT. I. IMMEDIATE RESULTS.** *(E.)* Nylander, G. (Dept. Surg., U. Uppsala, Sweden) and S. Wikstrom. *Acta Chir Scand* (Suppl. 385):5-69, 1968.

4783 **PROPULSIVE GASTROINTESTINAL MOTILITY IN REGIONAL AND GRADED**

MOTILITY

ISCHEMIA OF THE SMALL BOWEL. AN EXPERIMENTAL STUDY IN THE RAT. II. LATE RESULTS. *(E.)* Wikstrom, S. (Dept. Surg., U. Uppsala, Sweden). *Acta Chir Scand* Suppl (386):5-53, 1968.

4784 AN ELECTROMYOGRAPHIC STUDY OF ESOPHAGEAL CONTRACTION IN NORMAL MAN. *(Fr.)* Monges, H. (Fac. Med., Marseille, France), J. Salducci and C. Roman. *Arch Franc Mal Appar Dig* 57(6/7): 545-560, 1968.

4785 EFFECT OF HUMAN LYMPH AND BLOOD SERUM ON THE MOTOR AND SECRETORY ACTIVITY OF THE DUODENUM OF EXPERIMENTAL ANIMALS. *(Fr.)* Bartoš, V. (Fac. Med., Charles U., Hradec-Králové, Czechoslovakia), V. Brzek and A. Svatoš. *Cesk Gastroent Vyz* 22(4):230-234, 1968.

4786 X-RAY DATA ON THE EFFECT OF SOME NEUROTROPIC PREPARATIONS ON THE GASTROINTESTINAL TRACT. *(Rus.)* Rabukhina, N. A. (Moscow Sci.-Res. Inst. Roentgenol. Radiol., Min. Health RSFSR, USSR). *Klin Med (Moskva)* 46(7):90-95, 1968.

4787 ENDORADIOSONDE STUDIES OF INTESTINAL MOTILITY AT ST. ERIK'S HOSPITAL, STOCKHOLM, 1962-1966. *(E.)* Bárány, F. R. (St. Erik's Hosp., Stockholm, Sweden). *T Gastroent* 11(1):11-24, 1968.

4788 RADIOCINEMATOGRAPHY OF THE ANO-RECTAL REGION: A RADIOCINEMATOGRAPHIC STUDY OF ANAL CONTINENCE AND DEFECATION. *(Fl.)* Kerremans, R. (St. Rafael Acad. Hosp., Louvain, Belgium). *T Gastroent* 11(1):81-91, 1968.

4789 ELECTRICAL ACTIVITY AND MOTILITY OF THE INTERNAL ANAL SPHINCTER: AN *"IN VIVO"* ELECTROPHYSIOLOGICAL STUDY IN MAN. *(E.)* Kerremans, R. (St. Rafael Acad. Hosp., Louvain, Belgium). *Acta Gastroent Belg* 31(7):465-482, 1968.

4790 INTESTINAL SLOW WAVES: EFFECT OF TRANSECTION ON PROPAGATION VELOCITY. *(E.)* McCoy, E. J. (U. Texas Med. Branch, Galveston) and R. D. Baker. *Proc Soc Exp Biol Med* 129(2):562-563, 1968.

See also abstract nos.: 5086,5648

4791 **EFFECTS OF HEPATIC ARTERY LIGATION ON SURVIVAL AND METABOLISM OF DEPANCREATIZED DOGS.** *(E.)* Rappaport, A. M. (Dept. Physiol., U. Toronto, Canada), M. Vranic, J. Campbell, G. R. Green, J. S. Cowan and G. A. Wrenshall. *Amer J Physiol* 215(4):898-907, 1968.

The metabolic effects of total ligation of the hepatic artery on the metabolic functions of the liver important in the control of diabetes were investigated in male and female dogs. After partial depancreatization, the remaining uncinate process was autotransplatned under the skin of the abdomen in 6 dogs, 1 week after ligation of all branches of the hepatic artery. Within 3 months the pancreas was scarred. Hepatic structure and lipids were normal terminally, although severe diabetes gradually developed. When 5 dogs were totally depancreatized after hepatic artery ligation and cholecystectomy, and compared to 7 pancreatectomized dogs, there was increased survival without insulin treatment (21-57 days and 5-7 days, resp.), urinary ketone body and nitrogen excretion were decreased, plasma glucose and ketone bodies were reduced, and the usual increase in glucose production was decreased. There was no effect on the abrupt fall in the rate of glucose disappearance after pancreatectomy, but the rate increased again with hyperglycemia; terminally, there was a complete wastage of subcutaneous and mesenteric fat depots. Although severe diabetes developed in both groups of dogs, the pancreatic autograft probably secreted insulin at a reduced rate, thereby preventing fatty changes in the hepatocytes and chronic exhaustion of the fat stores.

4792 **RESPONSE OF HEPATIC ALPHA-GLYCEROPHOSPHATE TO CHANGES IN HEPATIC GLUCOSE FORMATION.** *(E.)* Frank, A. (Stanford U. Sch. Med., Palo Alto, Calif.), J. W. Farquhar and G. M. Reaven. *Metabolism* 17(9):776-785, 1968.

Changes in hepatic α-glycerophosphate (α-GP) concentration was measured following a variety of metabolic stimuli in normal rats and dogs. Stimuli tested included insulin, tolbutamide, fasting, intravenous glucose, and leucine. Decreases in hepatic α-GP concentration were seen whenever the liver was forced to channel carbons into new glucose formation. This was independent of both the experimental agent employed and the peripheral glucose concentration, and was thought to be a result of increased conversion of α-GP to glucose as well as decreased production of α-GP secondary to the demand for increased hepatic glucose formation. In contrast, conditions which inhibited formation of hepatic glucose were associated with increases in hepatic α-GP concentration. These changes were also independent of the specific agent employed or the plasma glucose concentration. The rise in hepatic α-GP was thought to be the result of increased conversion of 3-carbon fragments into triglyceride synthesis. The relative lability of hepatic α-GP concentration supports the hypothesis that α-GP may play an important role in regulating hepatic intermediary metabolism.

4793 **LIPID TRANSPORT IN LIVER. II. ELECTRON MICROSCOPIC AND BIOCHEMICAL STUDIES OF ALTERATIONS IN LIPOPROTEIN TRANSPORT INDUCED BY CORTISONE IN THE RABBIT.** *(E.)* Mahley, R. W. (Vanderbilt U. Med. Sch., Nashville, Tenn.), M. E. Gray, R. L. Hamilton and V. S. LeQuire. *Lab Invest* 19(4):358-369, 1968.

The cortisone-treated rabbit (25 mg b.i.d.) was utilized to study the participation of the hepatic parenchymal cell Golgi apparatus in very-low-density lipoprotein synthesis and secretion. Electron-translucent particles clustered in Golgi apparatus vesicles were identified as plasma very-low-density lipoproteins or their immediate precursors. Two distinct phases of lipid metabolism were correlated with changes in hepatocyte ultrastructure, and the etiology of the fatty liver induced by cortisone in the acute phase was shown to differ from that following prolonged treatment. In the short-term experiments (4 hr to 2 days), liposomal accumulation, accompanied by decreased serum lipid levels, indicated impaired or diminished very-low-density lipoprotein synthesis and/or secretion. At these times, there were morphological alterations in the Golgi apparatus. At 8 hr, Golgi apparatus vesicles containing very-low-density lipoprotein particles appeared to be forming lysosomes, suggesting intracellular catabolism. By 2 days, typical Golgi apparati were extremely rare. The 2nd phase of treatment (4 to 6 days) was characterized by a rise in serum lipid levels, a disappearance of hepatocyte lysosomes, and a dramatic increase in Golgi apparati containing numerous large particles clustered in secretory vesicles. These lipoprotein particles were larger in size (300 to 3000 Å) within both Golgi apparatus vesicles and the serum $D < 1.006$ fraction. At 4 and 6 days, large cytoplasmic lipid droplets characterized the fatty liver and probably reflected an increased rate of free fatty acid uptake and synthesis of triglyceride. Other morphological changes characteristic of cortisone treatment, occurring between 2 and 4 days, included a marked hypertrophy of the smooth endoplasmic reticulum and a change in the form of glycogen from the typical rosette to the monoparticulate form.

4794 **PIG LIVER PERFUSION WITH HUMAN BLOOD: THE EFFECT OF PREPARING AND FLUSHING THE LIVER WITH VARIOUS BALANCED SOLUTIONS ON ITS SUBSEQUENT VIABILITY AND FUNCTION.** *(E.)* Abouna, G. M. (Royal Victoria Infirm., Newcastle upon Tyne, England). *Brit J Surg* 55(10):761-768, 1968.

In 28 experiments divided into 6 groups, isolated pig livers were flushed and cooled with 5 different balanced electrolyte solutions and with Ringer's lactate. During this interval, determinations of tissue potassium and glycogen loss and gain in tissue water were made. Livers were stored for a period of 90 min and were then perfused with fresh heparinized human blood at 38C for a period of at least 8 hr. Liver recovery from hypoxia and hypothermia was assessed by measurement of the rate of uptake of potassium and glucose from the circulating blood and by the rate of bile production during the first 120 min of perfusion. Liver viability and function during perfusion were assessed by measurement of the rate of oxygen consumption, bile output, BSP excretion in the bile, clearance of lactate, synthesis of urea from ammonia, and synthesis of protein from labelled ^{14}C-lysine. Ringer's lactate was found to be an unsuitable solution for liver perfusion during the period of hypothermia and ischemia. Liver viability was better preserved using a balanced electrolyte solution previously buffered and oxygenated, containing added potassium, magnesium, sulfate, phosphate, glucose, insulin, and Dextran as the flushing solution.

4795 STUDIES ON THE SECRETION OF BILE BY THE ISOLATED RAT LIVER. I. COMPOSITION OF THE BILE IN RELATION TO THE PERFUSION MEDIUM. *(Ger.)* Baumung, H. (Inst. Gen. Exp. Path., U. Vienna, Austria), M. Peterlik and W. Vormittag. *Acta Hepatosplen* 15(5):308-315, 1968.

Paper-chromatographic studies on the bile obtained by cannula from anesthetized male Sprague-Dawley rats (1 g/kg ethylurethan i.p.) as well as the bile produced by isolated rat livers perfused with either diluted blood or a semisynthetic medium containing only rat erythrocytes, glucose and inorganic ions demonstrated that the qualitative composition of the bile with regard to amino acids, peptides, cholesterol, bile acids, bile pigments, phospholipids and neutral lipids is essentially independent of the perfusing fluid. The semisynthetic perfusion fluid was made up of the washed erythrocytes from 30 ml of heparinized rat blood suspended in 90 ml of a medium containing 68 mg% $NaHCO_3$, 836 mg% NaCl, 38 mg% KCl, 13 mg% $CaCl_2 \cdot 2\ H_2O$, 162 mg% $Na_2HPO_4 \cdot 2\ H_2O$, 25 mg% KH_2PO_4 and 100 mg% glucose. Bile was collected from the perfused livers for 3 hr after discarding the secretion of the 1st 10 min. All 3 biles were qualitatively identical, although the protein and nonprotein nitrogen contents were both lower in the bile from the perfused livers, especially those perfused with the semisynthetic medium. These results indicate that many substances can be excreted in the bile even if they are absent from the perfusing blood, and suggest that bile formation involves more than simple filtration and excretion of existing components.

4796 LIVER SIZE AND DNA SYNTHESIS UNDER THE INFLUENCE OF FOREIGN SUBSTANCES. *(Ger.)* Schlicht, I. (Inst. Pharmacol., Free U., Berlin, Germany), W. Koransky, S. Magour and R. Schulte-Hermann. *Naunyn Schmiedeberg Arch Pharm Exp Path* 261(1):26-41, 1968.

In male and female Wistar rats, reversible enlargement of the liver was produced by oral administration of either α-hexachlorocyclohexane (HCH, 200 mg/kg/day), phenobarbital (100 mg/kg/day) or β-diethylaminoethyl phenyldiallylacetate (CFT-1201, 75 mg/kg twice daily), even though the first 2 agents generally accelerate drug metabolism while the 3rd inhibits it. The extent of enlargement decreased with increasing age of the animals, and the return to normal liver size was slower for HCH than for the other two agents. In 7-week-old female rats, for example, the liver weight increased by 45% after a single dose of HCH and by a maximum of 100% after repeated doses (daily for 4 days), compared to a maximum of 35% after repeated doses of phenobarbital (daily for 8 days) and 14% after repeated doses of CFT-1201 (6 doses in 3 days). Results with male rats were similar. Biochemical studies showed that while CFT-1201 produced fatty infiltration, both HCH and phenobarbital produced proportional increases in liver protein, lipid, glycogen and water, with no sign of cell damage. Although this indicates that the enlargement due to CFT-1201 probably involves parenchymal damage, it is also known that CFT-1201 can induce certain microsomal enzymes. HCH and phenobarbital were also found to produce an increase in liver DNA (an increase which lagged behind the increase in liver weight), as well as an increase in the incorporation of labeled thymidine into liver DNA. Whereas the liver DNA increased significantly within 12-18 hr after HCH, an increase only appeared 48 hr after administration of phenobarbital. Since thymidine incorporation was increased by as much as 1000% after HCH, it is concluded that both HCH and phenobarbital initiate growth processes in the liver which are accompanied by *de novo* synthesis of DNA.

4797 THE "PUBERTY" OF THE RAT LIVER. II. PERMANENT CHANGES IN STEROID METABOLIZING ENZYMES AFTER TREATMENT WITH A SINGLE INJECTION OF TESTOSTERONE PROPIONATE AT BIRTH. *(E.)* Denef, C. (St. Rafael Acad. Hosp., Louvain, Belgium) and P. De Moor. *Endocrinology* 83(4):791-798, 1968.

Liver homogenates or microsomes obtained at the age of 4-5 months from male and female rats spayed and given either 50 or 500 μg of testosterone propionate s.c. on their first day of life or later were incubated with tritium-labeled cortisol, tetrahydrocortisol, progesterone and testosterone. Spayed females treated with either the low dose on the first day or the high dose on the sixth day developed a pattern of steroid metabolism characteristic of male adult animals, which was maintained during adult life. When adult female rats which had been castrated early after birth were treated with up to 10 daily injections of 500 μg of testosterone propionate, a typical masculine pattern was induced immediately after the final treatment. These effects disappeared completely, however, within 2 months. In males, a single dose of 50 or 500 μg at birth almost entirely prevented the differentiation of the feminine type of steroid metabolism found after castration performed the same day. It is concluded that testosterone given during neonatal life opens the possibility for permanent activation or depression of certain liver enzymes at puberty. During adult life, however, the effect of testosterone on these enzymes is only temporary.

4798 ETHANOL EFFECTS ON METHIONINE METABOLISM IN RAT LIVER. *(E.)* Finkelstein, J. D. (VA Hosp., Washington, D. C.) and W. E. Kyle. *Proc Soc Exp Biol Med* 129(2):497-501, 1968.

Male Sprague-Dawley rats were used in a study of the effect of ethanol feeding on 4 rat liver enzymes involved in methionine metabolism: methionine-activating enzyme (ATP:L-methionine-S-adenosyltransferase), cystathionine synthase, cystathionase (L-homoserine hydrolase), and betaine-homocysteine methyltransferase. In either chronic feeding or acute experiments, ethanol administration increased the level of methionine-activating enzyme in rat liver. The increase in methionine-activating enzyme did not occur in animals treated with puromycin or actinomycin D. The simultaneous administration of methionine or choline failed to inhibit this effect of ethanol. Prolonged feeding also led to an increase in hepatic cystathionase while acute intoxication resulted in a balanced increment in cystathionine synthase and betaine-homocysteine methyltransferase. The possible relation between these results and the increased lipotrope requirement which attends alcohol consumption in rats is discussed.

4799 LOCAL EFFECTS OF Na$^+$, K$^+$, Mg^{++}, AND Ca^{++} ON VASCULAR RESISTANCES IN THE DOG LIVER.

(E.) Chou, C. C. (Dept. Physiol., Michigan State U., East Lansing) and T. E. Emerson Jr. *Amer J Physiol* 215(5):1102-1106, 1968.

The effects of NaCl, KCl, MgCl$_2$ and CaCl$_2$ on hepatic arterial and portal vein resistances and liver weight were studied in isolated canine livers. The livers were perfused at constant flow through the hepatic artery (89.5 ml/min) and portal vein (77.3 ml/min) with blood from the femoral artery and portal vein of donor dogs. Isosmotic solutions of NaCl, KCl, MgCl$_2$ and CaCl$_2$ were infused separately into the hepatic artery or portal vein at rates of 0.4-7.8 ml/min. Portal vein vascular resistance was unaffected by any cation, whether infused into the hepatic artery or portal vein. MgCl$_2$ lowered hepatic arterial resistance whether infused into the hepatic artery or portal vein at all infusion rates, but did not alter liver weight. KCl had no apparent effect until the infusion rate reached 7.8 ml/min at which time it increased hepatic artery resistance and lowered liver weight. CaCl$_2$ failed to affect hepatic artery resistance and liver weight at any infusion rate. It is concluded that MgCl$_2$ lowers resistance while high concentrations of KCl increase the resistance of the vasculature supplied by the hepatic artery.

4800 BILIARY BILE ACIDS AND CHOLESTEROL IN DEVELOPING SHEEP.

(E.) Peric-Golia, L. (U. Utah Coll. Med., Salt Lake City) and H. Socic. *Amer J Physiol* 215(5):1284-1287, 1968.

The bile acid pattern and cholesterol content of gallbladder bile were studied by means of thin-layer and paper chromatography in immature sheep (from 1 day to 12 months of age). It was found that cholic acid is the predominant bile acid in this species and that chenodeoxycholic acid is the primary dihydroxycholanic acid; however, deoxycholic acid appeared 1 week after birth and increased from then until the 10th to 12th month. Conjugation with taurine markedly exceeded that with glycine, although the amount of glycine conjugates increased with age. The ratio between biliary bile acids and biliary cholesterol increased from birth to the age of 2 months, after which it remained relatively constant. It is suggested that the development of the bile acid pattern in immature sheep results from adaptation to the changes in postnatal development, i.e., nutrition with regard to the variation in conjugation, and infection of the intestinal tract with microorganisms with regard to hydroxylation of bile acids.

4801 THE EFFECTS OF ETHANOL ON THE CONCENTRATION OF GLUCONEOGENIC INTERMEDIATES IN RAT LIVER.

(E.) Zakim, D. (Fitzsimons Gen. Hosp., Denver, Colo.). *Proc Soc Exp Biol Med* 129(2):393-397, 1968.

In experiments on fasted female Sprague-Dawley rats, administration of ethanol (800 mg as a 35% aqueous solution) increased the hepatic concentration of glutamate, malate, and alpha-glycerophosphate, while the concentration of lactate was unchanged and the concentrations of aspartate, 2-phosphoglycerate, 3-phosphoglycerate, fructose-1,6-diphosphate, fructose-6-phosphate, and glucose-6-phosphate were decreased. Although the data are consistent with the hypothesis that ethanol decrease hepatic glucose production as a result of shunting substrates to lactate and alpha-glycerophosphate, the amount of alpha-glycerophosphate, lactate, and malate which accumulated after ethanol feeding was small in comparison to reported estimates of glucose production by the rat liver. It is concluded that the primary mechanism for ethanol-induced inhibition of hepatic glucose production is blockage by ethanol of the entry of intermediates into the gluconeogenic pathways.

4802 HEPATIC DISPOSITION OF PHENOLDIBROMPHTHALEIN DISULFONATE AND SULFOBROMOPHTHALEIN.

(E.) Klaassen, C. D. (U. Iowa Coll. Med., Iowa City) and G. L. Plaa. *Amer J Physiol* 215(4):971-976, 1968.

The plasma disappearance, metabolism, storage, and excretion of phenol-3,6-dibromophthalein (DBSP) and sulfobromophthalein (BSP), given in varying dosages for each determination, were compared in male Sprague-Dawley rats, white male rabbits and male dogs. With single administrations of BSP (60/mg/kg) or DBSP (49 mg/kg), the plasma disappearance of DBSP was slower than that of BSP in both rats and rabbits. In dogs receiving 15 mg/kg BSP or 12.2 mg/kg DBSP, the plasma disappearance rates were similar. With 90-min infusions of 2.0 mg/kg/min DBSP in rats and rabbits and 0.39 mg/kg/min in dogs, the hepatic storage of both dyes was higher in dogs than in rats and rabbits. Approximately 70% of the BSP appearing in the bile of all species during infusions of the biliary transport maximum (Tm) was conjugated while 2% of the DBS excreted by the rabbit and the dog was in the altered form. The biliary excretion of single doses of BSP and DBSP was reduced by placing the rats on protein-free diets. With dye infusions, the Tm for BSP was reduced by the protein-free diet while that for DBSP was unaffected. It appears that the metabolism of these analogs might not play as important a role in their elimination from plasma as had been thought on the basis of work carried out with BSP.

4803 EFFECT OF CLOFIBRATE ON SERUM AND HEPATIC LIPIDS IN NEPHROTIC RATS.

(E.) Hoak, J. C. (U. Iowa Coll. Med., Iowa City), W. E. Conner, M. L. Armstrong and E. D. Warner. *Lab Invest* 19(4):370-375, 1968.

The effects of clofibrate (an inhibitor of cholesterol synthesis) on serum and liver lipid concentrations were determined in normal rats and in rats made nephrotic by injections of puromycin aminonucleoside. Thirty-five white male rats were fed clofibrate (0.2% in the diet). Experimental animals were given daily s.c. injections of the aminonucleoside (15 mg/kg body weight, as a 0.5% aqueous solution), while control animals received equivalent amounts of distilled water. The aminonucleoside produced nephrosis in all rats, which developed signs of edema and ascites 10-12 days after the injections were started Animals were killed on the 10th, 13th, and 16th days. Clofibrate caused a decrease in serum cholesterol and triglyceride concentrations in both normal and nephrotic rats at 10 days.

Hepatic cholesterol concentrations were also lower in the clofibrate-fed rats. When the severity of the nephrosis increased in rats allowed to live for 13 and 16 days, the preventive effect of clofibrate against lipemia was diminished or lost. Electron microscopy revealed an extensive amount of rough endoplasmic reticulum and intracellular lipid in the livers of the nephrotic rats. Clofibrate treatment increased the amount of agranular endoplasmic reticulum and microbodies, and decreased intrahepatic lipid. These results indicate that the feeding of clofibrate reduces the usual lipemia associated with nephrosis, which probably reflects an inhibitory effect on the synthesis of lipids by the liver.

4804 DETERMINANTS OF *IN VITRO* BINDING OF BARBITURATES BY RAT HEPATIC SUBCELLULAR FRACTIONS. *(E.)* Soyka, L. F. (Stanford U. Sch. Med., Calif.). *Proc Soc Exp Biol Med* 128:322-325, 1968.

The *in vitro* binding of barbiturates by rat hepatic subcellular fractions was studied in an attempt to relate differences in substrate-protein interaction to alterations in drug metabolism. Pentobarbital-2-^{14}C, phenobarbital-2-^{14}C, and barbital-2-^{14}C (5×10^{-8} moles) were added to subcellular fraction suspensions prepared from normal rat liver and incubated for 15 min at 37C. In displacement studies, unlabeled drug (5×10^{-5} moles) was added and incubation was continued for an additional 15 min. After precipitation with 2 ml of 10% trichloroacetic acid and subsequent centrifugation, aliquots of the supernatant were taken taken for determination of radioactivity in a liquid scintillation spectrometer and for determination of protein. Binding of pentobarbital and phenobarbital by the microsomal fraction was 10-fold greater than that of barbital. The microsomal fraction also exhibited an age-dependent increase in binding per unit of protein, but no differences were found between sexes, or following phenobarbital pretreatment.

4805 BILE FORMATION IN GUINEA PIGS: ANALYSIS WITH INERT SOLUTES OF GRADED MOLECULAR RADIUS. *(E.)* Forker, E. L. (Dept. Med., U. Iowa, Iowa City). *Amer J Physiol* 215(1):56-62, 1968.

^{14}C-Labeled urea, malonamide, erythritol, mannitol, sucrose, or polyethylene glycol were given alone (2-5 μC) or together with 15 μC of mannitol-^{3}H as a single i.v. injection to anesthetized guinea pigs (250-350 g body wt) prepared with a common-bile-duct fistula to determine their respective biliary clearances and the relation between clearance rate and bile flow during choleresis. Clearance rates during spontaneous bile flow were measured in the steady state using bile collected during the last 15 min of a 2-hr equilibration period and 75 μl of carotid arterial blood removed at the midpoint of this clearance interval. Maximum choleresis was subsequently maintained for 25 min by continuous i.v. infusion of sodium dehydrocholate (100 mg) or Boots secretin (5 U). A second measurement of clearance was derived from the radioactivity present in the bile and blood collected at the end of this period. Except for urea, which achieved diffusion equilibrium in bile under all circumstances, the rate of change of solute clearance with flow was less than 1 and less during secretin choleresis than with sodium dehydrocholate choleresis. For solutes the size of mannitol or less, clearance during bile salt choleresis was nearly directly proportional to bile flow and appeared to enter bile principally by osmotic filtration rather than diffusion. For the larger solutes (sucrose and polyethylene glycol), diffusion was thought to play an important role. Based on clearance curves of the smaller solutes, 2 tentative conclusions are drawn: that canalicular bile may be modified by ductular fluid reabsorption in the guinea pig, and that the equivalent radius of pores in the canalicular membrane is probably in the range of 5-10 Å.

4806 BROMSULPHALEIN (BSP) CLEARANCE IN AGING RATS. *(E.)* Hollander, C. F. (Netherlands Cancer Inst., Amsterdam), F. R. de Leeuw-Israel and J. M. Arp-Neefjes. *Exp Geront* 3(2):147-153, 1968.

An ultramicro form of the BSP clearance test was used to study changes in liver function with age in female rats. This technique made it possible to repeat the test several times in the same animal and thus to perform a longitudinal study. The BSP retention measured 15, 30 and 45 min after a single injection of the dye was significantly lower in 3-month-old rats than in 6-, 9-, 12- and 30-month-old rats, while the values in the last 4 groups did not differ significantly. The results of this study are related to a change in liver-cell population during maturations, involving polyploidy and a change in number of parenchymal cells.

4807 REGULATION OF GLYCOGEN METABOLISM IN LIVER BY THE AUTONOMIC NERVOUS SYSTEM: III. DIFFERENTIAL EFFECTS OF SYMPATHETIC-NERVE STIMULATION AND OF CATECHOLAMINES ON LIVER PHOSPHORYLASE. *(E.)* Shimazu, T. (Osaka U. Med. Sch., Japan) and A. Amakawa. *Biochim Biophys Acta* 165(3): 349-356, 1968.

Differences between the effects of splanchnic-nerve stimulation and of catecholamines on the glycogenolytic enzymes in rabbit liver were investigated in adult male rabbits weighing 2.3-2.5 kg. Splanchnic nerve stimulation caused a rapid increase in the activity of liver glucose-6-phosphatase while administration of catecholamines had no effect. Activation of liver phosphorylase by splanchnic nerve stimulation was faster than that by catecholamines. The activation was maximal within 30 sec after the onset of nerve stimulation, while the activation induced by epinephrine reached a maximum after 60 sec. Furthermore, phosphorylase activation produced by endogenous catecholamines, released in response to sympathetic stimulation, required minutes rather than seconds. Activation of phosphorylase after splanchnic nerve stimulation was not blocked by previous administration of reserpine, which causes depletion of norepinephrine at the sympathetic nerve terminals. The effect of catecholamines on liver phosphorylase was blocked by dichloroisoproterenol, whereas the effect of splanchnic nerve stimulation was not. This suggests that sympathetic nerves and catecholamines activate liver phosphorylase by different mechanisms. It seems likely that there are two separate mechanisms in the liver for controlling phosphorylase activation and glycogenolysis, and that neural control is much faster than hormonal control.

4808 METABOLISM OF PROSTAGLANDINS IN RAT LIVER MITOCHONDRIA. *(E.)* Hamberg, M. (Royal Vet. Inst., Stockholm, Sweden). *Europ J Biochem* 6(1):135-146, 1968.

A series of 9 ^{14}C-labeled prostaglandins was incubated with the beta-oxidizing enzyme system of rat liver and the structures of the metabolites formed were determined by chromatographic and mass spectrometric techniques. All of the compounds tested were oxidized. Prostaglandin E., prostaglandin B_1, prostaglandin $F_{1\alpha}$ and prostaglandin $F_{1\beta}$ were converted into the corresponding C-18 homologues. Prostaglandin A_1, 11α, 15-dihydroxy-9-ketoprostanoic acid and 11α-hydroxy-9,15-diketoprostanoic acid yielded mixtures of the C-16 and C-18 homologues. Norprostaglandin $F_{1\alpha}$ and homoprostaglandin $F_{1\alpha}$ were both coverted to trinorprostaglandin $F_{1\alpha}$.

4809 THE HETEROGENEOUS COMPOSITION OF THE SMOOTH MICROSOMAL MEMBRANES IN RAT LIVER. E.) Glaumann, H. (Sabbatsberg Hosp., Stockholm, Sweden), A von der Decken and G. Dallner. *Life Sci* 7(17):905-911, 1968.

Data are presented on the phospholipid and cholesterol content of the 2 smooth and 1 rough subfractions of rat liver microsomes the effect of phenobarbital (80 mg/kg/day i.p. for 5 days), the incorporation of glycerol-^{3}H, acetate-^{3}H and leucine-^{14}C into phospholipids, cholesterol and protein, resp., and the distribution of adenosine monophosphatase, monoaminoxidase, cytochrome C oxidase and acid phosphatase in various liver cell fractions. The experiments on phospholipid content and composition, albumin transport and marker enzymes indicate strongly that both smooth and rough subfractions of liver microsomes are derived either from the endoplasmic reticulum or from closely related membranes. On the other hand, the differences in neutral lipid and enzyme composition, the turnover data, and the absence of a phenobarbital effect on the smooth II microsomes demonstrate heterogeneity and specialization within the membranes of the microsomal fraction. Each of the 2 types of smooth microsomes might still represent heterogeneous fractions, but this could be decided only by elaboration of further subfractionation procedures.

4810 EFFECT OF RAT LIVER ACID PHOS–PHATASE ON GLUCOSAMINE-6-PHOSPHATE. COMMUNICATION V. *(It.)* Tesoriere, G. (Inst. Biol. Chem., U. Palermo, Italy), C. Nicotra and R. Vento. *Boll Soc Ital Biol Sper* 44(4):278-281, 1968.

4811 DEPHOSPHORYLATION OF GLUCOSAMINE-6-PHOSPHATE IN RAT LIVER HOMOGENATES. COMMUNICATION IV. *(It.)* Tesoriere, G. (Inst. Biol. Chem., U. Palermo, Italy), G. Nicotra and R. Vento. *Boll Soc Ital Biol Sper* 44(4):276-278, 1968.

4812 LIVER ENZYME ACTIVITIES IN THE AMMONIA FIXATION BY THE HUMAN BEING. *(E.)* Ortiz-Pineda, J. (Natl. Inst. Nutrit., Mexico City), L. Guevara, G. Serrano and G. Soberón. *Bol Estud Med Biol Mex* 25(2):73-82, 1968.

4813 PHOSPHATASES. III. INVESTIGATION OF CHANGES OF THE ALKALINE PHOSPHATASE ISOENZYMES IN THE COURSE OF CHOLEDOCHAL OBSTRUCTION IN THE RAT, USING THE TECHNIQUE OF MICROELECTROPHORESIS IN AGAR GEL. *(E.)* Stepán, J. (1st Inst. Med. Foren. Chem., Charles U., Prague, Czechoslovakia), B. Večerek and K. Kácl. *Acta Hepatosplen* 15(5):331-337, 1968.

4814 BIOTRANSFORMATION IN THE LIVER: IMPLICATIONS FOR HUMAN DISEASE. *(E.)* Marver, H. S. (U. California Med. Ctr., San Francisco). *Gastroenterology* 55(2):282-289, 1968.

4815 LIPOGENESIS IN BIOTIN DEFICIENCY. *(E.)* Dakshinamurti, K. (Dept. Biochem., U. Manitoba, Winnipeg, Canada) and P. R. Desjardins. *Canad J Biochem* 46(10):1261-1267, 1968.

4816 PROBLEMS IN THE REGULATION OF HEPATIC METABOLISM. III. MECHANISMS FOR THE REGULATION OF LIPID METABOLISM. *(Rev.)(Ger.)* Förster, E. (Inst. Biochem., U. Freiburg i. Br., Germany), A. W. Holldorf and H. Falk. *Acta Hepatosplen* 15(5):292-307, 1968.

4817 EFFECT OF PARTIAL HEPATECTOMY ON THE RESPONSIVENESS OF MICROSOMAL ENZYMES AND CYTOCHROME P-450 TO PHENOBARBITAL OR 3-METHYLCHOLANTHRENE. *(E.)* Gram, T. E. (Natl. Heart Inst., NIH, Bethesda, Md.), A. M. Guarino, F. E. Greene, P. L. Gigon and J. R. Gillette. *Biochem Pharmacol* 17(9):1769-1778, 1968.

4818 STUDIES ON THE DESTRUCTION OF LIVER MICROSOMAL CYTOCHROME P-450 BY CARBON TETRACHLORIDE ADMINISTRATION. *(E.)* Sasame, H. A. (Natl. Heart Inst., NIH, Bethesda, Md.), J. A. Castro and J. R. Gillette. *Biochem Pharmacol* 17(9):1759-1768, 1968.

4819 LOCALIZATION OF THE GLYCOPROTEINS WHICH BIND CORTICOSTEROID HORMONES IN THE SUBCYTOPLASMIC FRACTIONS OF THE HEPATOCYTES. *(Fr.)* Louisot, P. (Fac. Med., Lyon, France), J. Guidollet and J. Tréfouel. *C R Acad Sci [D] (Paris)* 267(12):1063-1066, 1968.

4820 THE EFFECT OF CORTISONE TREATMENT ON THE MATURATION OF THE LIVER GLYCURONYLTRANSFERASES IN THE NEWBORN RAT. *(It.)* Cordone, G. (G. Gaslini Pediat. Clin., U. Genoa, Italy), P. Moscatelli and B. Fregonese. *Minerva Pediat* 20(29):1484-1488, 1968.

4821 THE HEXOSE MONOPHOSPHATE SHUNT IN THE IMMATURE LIVER: GLUCOSE-6-PHOSPHATE DEHYDROGENASE AND 6-PHOSPHOGLUCONATE DEHYDROGENASE ACTIVITIES. *(It.)* Cordone, G. (G. Gaslini Pediat. Clin., U. Genoa, Italy), G. Gemme, P. Moscatelli and B. Fregonese. *Minerva Pediat* 20(29):1479-1483, 1968.

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4822 **PROBLEMS IN THE REGULATION OF LIVER METABOLISM. II. MECHANISMS FOR THE REGULATION OF CARBOHYDRATE METABOLISM.** *(Ger.)* Förster, E. (Inst. Biochem., U. Freiburg i. Br., Germany), A. W. Holldorf and H. Falk. *Acta Hepatosplen* 15(4):257-274, 1968.

4823 **THE EFFECT OF HORMONES ON SECRETION OF DYES BY THE LIVER.** *(Ger.)* Skaunic, V. (1st Med. Clin., Charles U., Hradec-Králové, Czechoslovakia), V. Nerad and J. Skaunicová. *Acta Hepatosplen* 15(5):322-326, 1968.

4824 **STIMULATION OF LIVER CHOLESTEROL SYNTHESIS BY ACTINOMYCIN D.** *(E.)* DeMatteis, F. (Med. Res. Coun. Lab., Carshalton, England). *Biochem J* 109(5):775-785, 1968.

4825 **SUPPRESSION OF HEPATIC CHOLESTEROGENESIS IN THE RAT BY LITHIUM ION.** *(E.)* Leal, R. S. (Inst. Bento Da Rocha Cabral, Lisbon, Portugal) and M. J. M. Lyra. *Canad J Biochem* 46(2):138-139, 1967.

4826 **EFFECT OF THYROID HORMONES ON METABOLISM. II. THE EFFECT OF ADRENALECTOMY OR HYPOPHYSECTOMY ON RESPONSES OF RAT LIVER ENZYME ACTIVITY TO L-THYROXINE INJECTION.** *(E.)* Freeland, R. A. (U. California, Davis), E. H. Avery and A. R. Taylor. *Canad J Biochem* 46(2):149-150, 1967.

4827 **AGENTS AFFECTING LIPID METABOLISM. XXXI. PROPERTIES OF AN INHIBITOR OF CHOLESTEROL SYNTHESIS PRESENT IN RABBIT LIVER MITOCHONDRIA.** *(E.)* Cayen, M. N. (Ayerst Res. Lab., Montreal, P. Q., Canada) and D. Dvornik. *Canad J Biochem* 46(2):186-187, 1967.

4828 **AGENTS AFFECTING LIPID METABOLISM. XXXII. EFFECT OF A LIVER MITOCHONDRIAL EXTRACT ON CHOLESTEROL SYNTHESIS IN THE RAT.** *(E.)* Cayen, M. N. (Ayerst Res. Lab., Montreal, P. Q., Canada), P. Hill and D. Dvornik. *Canad J Biochem* 46(2):190-191, 1967.

4829 **TRANSPORT OF SOME AMINO ACIDS AND SUGARS IN RAT-LIVER SLICES.** *(E.)* Crawhall, J. C. (Child. Hosp. Philadelphia, Pa.) and S. Segal. *Biochim Biophys Acta* 163(2):163-170, 1968.

4830 **STUDIES ON HEPATIC MICROSOMAL N- AND O-DEALKYLATION OF MORPHINE ANALOGUES.** *(E.)* George, W. J. (U. Michigan Med. Sch., Ann Arbor) and T. R. Tephly. *Molec Pharmacol* 4(5):502-509, 1968.

4831 **MICROSOMAL N-DEMETHYLASE ACTIVITY IN DEVELOPING RAT LIVER AFTER ADMINISTRATION OF 3-METHYLCHOLANTHRENE.** *(E.)* Bresnick, E. (Baylor U. Coll. Med., Houston, Texas) and J. G. Stevenson. *Biochem Pharmacol* 17(9):1815-1822, 1968.

4832 **5-HYDROXYTRYPTAMINE METABOLISM IN RAT BRAIN AND LIVER HOMOGENATES.** *(E.)* Feldstein, A. (Worcester Found. Exp. Biol., Shrewsbury, Mass.) and O. Williamson. *Brit J Pharmacol* 34(1):38-42, 1968.

4833 **ELECTROSHOCK, LIVER SEROTONIN LEVEL AND TRYPTOPHAN PYRROLASE ACTIVITY IN RATS.** *(E.)* Satoh, T. (Fac. Pharm. Sci., Hokkaio U., Sapparo, Japan) and T. Iwamoto. *Jap J Pharmacol* 18(1):89-92, 1968.

4834 **INHIBITORY EFFECT OF CARBON MONOXIDE ON THE HYDROXYLATION OF TESTOSTERONE BY RAT LIVER MICROSOMES.** *(E.)* Conney, A. H. (Wellcome Res. Lab., Tuckahoe, New York), W. Levin, M. Ikeda, R. Kuntzman, D. Y. Cooper and O. Rosenthal. *J Biol Chem* 243(14):3912-3915, 1968.

4835 **RAPID, RESPIRATION-INDEPENDENT BINDING OF ALKALI METAL CATIONS BY RAT LIVER MITOCHONDRIA.** *(E.)* Gear, A. R. L. (Johns Hopkins U. Sch. Med., Baltimore, Md.) and A. L. Lehninger. *J Biol Chem* 243(14):3953-3962, 1968.

4836 **IDENTIFICATION OF A PHOSPHATE-INCORPORATING PROTEIN FROM BOVINE LIVER AS NUCLEOSIDE DIPHOSPHATE KINASE AND ISOLATION OF 1-^{32}P-PHOSPHOHISTIDINE, 3-^{32}P-PHOSPHOHISTIDINE, AND N- -^{32}P-PHOSPHOLYSINE FROM ERYTHROCYTIC NUCLEOSIDE DIPHOSPHATE KINASE, INCUBATED WITH ADENOSINE TRIPHOSPHATE-^{32}P.** *(E.)* Wålinder, O. (Inst. Med. Chem., U. Uppsala, Sweden). *J Biol Chem* 243(14):3947-3952, 1968.

See also abstract nos.: 4853,5429,5542,5551

4837 AN INTRAVENOUS GALACTOSE TOLERANCE TEST AND ITS USE IN HEPATOBILIARY DISEASES. *(E.)* Tengström, B. (U. Hosp., Uppsala, Sweden). *Acta Med Scand* 183(1-2):31-40, 1968.

An i.v. galactose tolerance test is described which involves the serial determination of blood galactose by a specific galactose oxidase method following a single injection of 350 mg of galactose/kg body weight. The following subjects were investigated: 18 healthy medical students (17 males, 1 female) with a mean age of 25 yr; 56 patients (38 males, 18 females) with no hepatic disease between the ages of 15 and 66 yr; 55 patients (25 males, 30 females) with cirrhosis of the liver; 40 patients (21 males, 19 females) with infectious hepatitis; 16 patients (10 males, 6 females) with metastatic cancer of the liver; and 27 patients (9 males, 18 females) with obstructive jaundice. The T½ value was found to be elevated in 84% of the patients with liver cirrhosis, and this elevation appeared to be a measure of the degree of liver damage. The results were also abnormal in 85% of the patients with acute infectious hepatitis and 50% of those with cancer, but the T½ value was normal in 93% of the patients with biliary obstruction. This galactose tolerance test is a valuable diagnostic tool for the investigation of different liver disorders.

4838 USE OF WHOLE-BODY COUNTER TO STUDY BODY RETENTION OF RADIOCOPPER IN WILSON'S DISEASE. *(E.)* Hamamoto, K. (Mayo Clinic, Rochester, Minn.), W. N. Tauxe, L. P. Novak and N. P. Goldstein. *J Lab Clin Med* 72(5):754-759, 1968.

The body retention of radiocopper (^{64}Cu) was determined in 7 patients with Wilson's disease, 14 heterozygous carriers, and 9 normal subjects by the use of a whole-body counter in order to evaluate the reliability of this method as a screening test for Wilson's disease. The mean body retention of ^{64}Cu at 72 hr after i.v. injection was 97.5% in the patients with Wilson's disease, 94.4% in the heterozygous carriers, and 87.8% in the normal subjects. Biologic half-time of ^{64}Cu retention was 97.0, 39.4, and 17.1 days, resp. These observations suggest that study of the body retention of ^{64}Cu will make it possible to distinguish between heterozygous carriers and homozygous normal individuals, and may be useful as a screening test to diagnose the carrier state in high-risk groups.

4839 RADIOACTIVE ROSE BENGAL TESTING IN THE DIFFERENTIAL DIAGNOSIS OF JAUNDICE. *(E.)* Whiting, E. G. (William Beaumont Gen. Hosp., El Paso, Tex.) and M. L. Nusynowitz. *Surg Gynec Obstet* 127(4): 729-733, 1968.

The results of ^{131}I-Rose Bengal (25-150 μC i.v.) liver function studies and scintiscanning in the differential diagnosis of jaundice were compared in 56 patients, including 35 with nonobstructive jaundice, 2 with intrahepatic obstructive jaundice, 8 with extrahepatic obstructive jaundice, and 11 normal controls. The rate of removal of ^{131}I (25 μC i.v.) from the blood, which is taken as a reflection of liver function, was first determined in the postabsorptive state by monitoring over the temporal region, accompanied by simultaneous monitoring of radioactivity over the intestine to rule out obstructive jaundice. In the absence of an increase in the intestinal count following a fatty meal, 150 μC of Rose Bengal was injected and liver scanning was carried out. The radioactivity then appeared mainly in the intestines if the biliary tree was patent, mainly in the liver if there was an intrahepatic obstruction, and mainly in the gallbladder if there was extrahepatic obstruction. The results of Rose Bengal scanning were normal in 10 of the 11 normal controls, and in 2 of 35 with nonobstructive jaundice. Rose Bengal scanning indicated nonobstructive jaundice in 33 of the latter group, as well as in one normal patient and one with extrahepatic obstruction. Intrahepatic and extrahepatic obstruction were correctly diagnosed by Rose Bengal scanning in 2 of 2 and 7 of 8 cases, resp., and the type of jaundice was correctly determined in 98% of all cases (perfect correlation between Rose Bengal scanning and other diagnostic techniques in 93%). Wider use of the Rose Bengal technique in the differential diagnosis of obstructive jaundice is urged.

4840 QUANTITATIVE ESTIMATION OF BLOOD LOSS VIA THE GASTROINTESTINAL TRACT IN TYPHOID FEVER USING RADIOACTIVE ISOTOPES. *(Pol.)* Stempień, R. (Infect. Dis. Clin., Med. Acad., Lodz, Poland), D. Kamińska, Z. Adamczewski and H. Niedzielska. *Przegl Epidem* 22(2):243-246, 1968.

In 14 patients (23-52 yr old) with typhoid fever, the red blood cells were labeled with ^{51}Cr by the method of Owen (*J Lab Clin Med.*, 47:72, 1956) and the daily blood loss via the digestive tract was determined from the radioactivity in the stools during a 10-day period. The mean blood loss was found to be 0.75-1.55 ml/day in 5 patients observed during the 2nd and 3rd weeks of typhoid fever, and 0.63-18.92 ml/day in 9 patient observed during the 3rd and 4th weeks of the disease. In most cases, blood loss decreased during the 10-day period. The maximum blood loss observed was 39 and 44 ml/day in two patients.

4841 COMPARATIVE EVALUATION OF THE BROMSULFALEIN AND GALACTOSE TOLERANCE TESTS IN CHRONIC LIVER DISEASE: THE VALIDITY AND LIMITS OF DISCRIMINANT ANALYSIS APPLIED TO THE TWO TESTS FOR THE DIAGNOSIS OF HEPATIC CIRRHOSIS. *(It.)* Coltorti, M. (Inst. Spec. Med. Path., U. Naples, Italy), A. Di Simone, G. Budillon, M. Carrella and G. Oriani. *Policlinico [Med]* 75(4):189-215, 1968.

The clearance of bromsulfalein (BSP; 500 mg in 10 ml solution i.v.) and galactose (25 g as 50% aqueous solution i.v.) from the blood were compared in a total of 92 patients: 48 with hepatic diseases other than cirrhosis (36 without jaundice and 12 with jaundice) and 44 with cirrhosis of the liver (29 without jaundice and 15 with jaundice, jaundice being defined as a serum bilirubin of 2 mg% or higher. On the basis of factorial analysis, the BSP test showed some difference between cirrhotics and noncirrhotics, but there was a marked overlap between the two groups and the effect of jaundice *per se* was greater than the effect of cirrhosis. The mean retention of BSP at 45 minutes was 19.5% and 44.75% in noncirrhotic patients without and with jaundice, resp., compared to 31.13% and 39.53% in cirrhotic patients without and with jaundice. The galactose test also showed considerable overlap between cirrhotics and noncirrhotics, but the difference between the two groups was more significant and the effect of jaundice was negligible. Thus, the clearance constants for the 4 groups listed above were 4.75, 4.86, 2.88 and 2.38, resp., compared to 7.59 in healthy controls. Neither test was appreciably affected by the presence or absence of ascites, and there was a good correlation (r = 0.426) between the galactose clearance and BSP retention, as well as among the other parameters mentioned. In view of the marked effect of jaundice on BSP clearance, the galactose test would seem to be more reliable in the diagnosis of biliary cirrhosis. However, the diagnostic effectiveness can be increased significantly by the use of discriminant analysis, utilizing the results of both tests. By this technique, a correct diagnosis was obtained in 66 of 82 cases, the 16 errors including 7 false-negatives among 41 cirrhotics and 9 false-positives among 41 patients with hepatic diseases other than cirrhosis.

4842 DOUBLE-DOSE DRIP-INFUSION CHOLANGIOGRAPHY: AN ANALYSIS OF 107 CONSECUTIVE CASES.

(E.) Bornhurst, R. A. (Upstate Med. Ctr., Syracuse, N. Y.), E. R. Heitzman and J. G. McAfee. *JAMA* 206(7):1489-1494, 1968.

A drip infusion of a larger than usual volume (40 cc) of 52% iodipamide meglumine with 60 cc of 5% dextrose in water at a flow rate of 1.5 drops/sec was administered in 107 consecutive patients in order to overcome the incomplete or faint visualization of the biliary system commonly seen in routine, single-injection i.v. cholangiography (20 cc of 52% iodipamide meglumine). This method produced no instances of nonvisualization in patients with serum bilirubin levels below 3 mg/100 ml. As a rule, the duct system was densely opacified, and stones in the common duct could be directly seen as radiolucencies. In 32 patients who were operated upon, correlation of roentgenographic interpretation and surgical findings was excellent. There were no false positive or false negative findings. Diagnosis of obstructions within the common duct can be based on direct rather than indirect signs with this method. Reactions to the larger volume of contrast medium were minimal and were less frequent than in standard i.v. cholangiography.

4843 "BILIARY TRACT ENZYMOLOGY": A CLINICAL COMPARISON OF SERUM ALKALINE PHOSPHATASE, LEUCINE AMINOPEPTIDASE, AND 5'-NUCLEOTIDASE.

(E.) Batsakis, J. G. (U. Michigan Med. Ctr., Ann Arbor), B. J. Kremers, M. M. Thiessen and J. M. Shilling. *Amer J Clin Path* 50(4):485-490, 1968.

A clinicopathologic study and comparison of the serum activities of alkaline phosphatase, leucine aminopeptidase, and 5'-nucleotidase was carried out in 178 patients representing 7 major disease categories, with emphasis on hepatobiliary disorders. Alkaline phosphatase activity was determined by an automated version of the method of Babson; leucine aminopeptidase activity was determined by a modified Goldberg and Rutenburg method; 5'-nucleotidase was determined by the method of Schwartz and Bodansky. Normal values of enzyme activities were determined in healthy controls. The findings indicated that the problems of differential diagnosis of jaundice have been little affected by the introduction of leucine aminopeptidase and 5'-nucleotidase estimations. Diseases not involving the liver or its duct systems are seldom associated with elevated serum activity of leucine aminopeptidase or 5'-nucleotidase. No distinction can be made by these 3 tests alone between carcinoma of the pancreas and other benign or malignant disorders of the hepatobiliary-pancreatic duct system which may give rise to jaundice. It was further determined that the serum activities of leucine aminopeptidase and 5'-nucleotidase are not affected by osteoblastic activity.

4844 ULTRASONIC SCANNING IN DIAGNOSIS OF ABDOMINAL DISEASE.

(E.) Holm, H. H. (Gentofte Hosp., Hellerup, Copenhagen, Denmark) and T. Mortensen. *Acta Chir Scand* 134(5):333-341, 1968.

The theoretical principles, techniques, advantages, limitations and possibilities of ultrasonic scanning are discussed on the basis of experience with about 200 patients diagnosed during a 1-yr period. Manual scanning in the longitudinal and transverse directions was carried out with a TMA-2 Somascope equipped with a memory scope and a polaroid-type oscilloscope camera, coupled to a mobile scanning unit using sound heads operating at 2 megacycles/second with a focal distance of 10 cm. Normal and abnormal scans of the liver, kidneys, stomach, spleen and abdominal cavity are presented from 14 illustrative cases, including patients with cirrhosis of the liver, metastatic liver cancer and biliary tract obstruction, rupture of the spleen, renal, ovarian or pancreatic cysts, aortic aneurysm, and retroperitoneal tumors. It is concluded that ultrasonic scanning is a convenient diagnostic technique which yields a different type of information than can be obtained by X-ray or scintillation scanning. The technique is far from fully developed, and its usefulness is limited to organs which are not covered by bone, air-filled intestine or lung. However, it has already proven valuable in the diagnosis of ascites, cirrhosis, splenomegaly and cancer of the liver, as well as various gynecological and urological conditions.

4845 THE BEHAVIOR OF THE SO-CALLED LEUCINE AMINOPEPTIDASE (LAP) IN THE SERUM AS STUDIED WITH VARIOUS SUBSTRATES.

(Ger.) Brunner, G. (Med. Clin., U. Göttingen, Germany), J. Sommer and R. Kattermann. *Klin Wschr* 46(10):541-547, 1968.

The rate of hydrolysis of L-leucyl-β-naphthylamide, L-leucyl-p-nitroanilide and L-leucylglycine was studied in sera obtained from 56 control subjects, 51 patients with hepatobiliary disease, myocardial infarction or increased osteoblast activity, and 6 rats with obstructive jaundice due to ligation of the common bile duct. The normal value for leucylglycine hydrolase (LGH) was found to be 14.9 IU for men and 8.2 IU for women, with a range up to 26.1 and 17.2 IU, resp. LGH was essentially normal (7.2-29.0 IU) in 17 patients with obstructive jaundice of varying etiology (choledocholithiasis, cancer of the liver, gallbladder or pancreas), even though the alkaline phosphatase, leucylnaphthylamide hydrolase (LNH) and leucylanilide hydrolase (LAH) were all elevated; the serum transaminases in these patients were generally within normal limits. LGH was also essentially normal (4.1-25.6 IU) in 6 patients with cirrhosis of the liver (all with increased alkaline phosphatase and 5 with increased LNH and LAH levels), 5 patients with increased alkaline phosphatase due to hyperactivity of the osteoblasts (all of whom also had normal LNH and LAH levels), and 4 patients with myocardial infarction (normal LNH levels but increased SGOT in 2 cases). However, the LGH was markedly increased (77.1-3108.0 IU) in 16 patients with liver parenchymal damage (due to hepatitis in 15 and to alkylphosphate poisoning in 1), all of whom also had increased transaminase and bilirubin levels even though the LNH, LAH and alkaline phosphatase were often normal, as well as in 3 patients in hepatic coma who also had markedly increased transaminase and moderately increased LNH and LAH levels. In rats, the alkaline phosphatase, SGOT, SGPT and LGH all increased rapidly after ligation of the common bile duct, reaching maximum values at 24 hr, but there was no change in LNH or LAH. It is concluded that, in liver parenchymal damage, the serum LGH activity generally parallels that of SGOT, and that LGH is probably specific for the liver.

4846 SPLENOPORTOSCINTIGRAPHY TO DEMONSTRATE PORTOSYSTEMIC SHUNTS. *(E.)*

Hofer, R. (2nd Med. Clin., U. Vienna, Austria), E. Ogris and G. Pfeiffer. *J Nucl Med* 9(12):624-629, 1968.

Whereas intrasplenically-injected, heat-denatured, radioiodine-labeled human serum albumin with a particle size greater than 1μ is localized exclusively to the liver and spleen in normal subjects, in patients with portosystemic shunts the isotope can also be detected in the lungs. Moreover, the size of the shunt can often be estimated from the relative amounts of isotope in the lung and liver. A preparation with a particle size of 5-50μ was injected intrasplenically (dose of about 10 ml) into 12 patients (7 men and 5 women, 18-70 yr old) in order to detect the possible presence of portosystemic shunts due to obstruction of the splenic vein. These patients (5 of whom had cirrhosis and 1 of whom had a surgical portocaval anastomosis) had a serum bilirubin ranging from 0.5 to 6.2 mg%, an SGOT ranging from 7 to 51 units, a total serum protein of 5.1-8.3 g%, a serum albumin of 27.9-60.2%, and a BSP retention (7 cases) of 4-42%. Although radiology revealed esophageal varices in only 2 cases, splenoportoscintigraphy revealed portosystemic shunts in 8 cases (5 of 8 severe). These findings were partially confirmed by autopsy. It is concluded that splenoportoscintigraphy is more reliable than X-ray of the esophagus for the detection of portosystemic shunts. However, shunts smaller than 5μ in diameter, which might be detected by the rare-gas method, would go undetected by this technique, as would shunts between the portal and pulmonary veins.

4847 THE EXCRETION OF BROMSULFALEIN IN CHILDREN. *(Ger.)*

Wichmann, H. M. (Pediat. Clin., Justus-Liebig U., Giessen, Germany), H. Rind and E. Gladtke. *Z Kinderheilk* 103(4):262-276, 1968.

Control studies of BSP excretion in 121 normal infants and children (48 born at term and 73 premature births, from a few days up to 14 yr of age) showed that the BSP half-life (time required for the concentration to decrease by 50%) is 5.5 ± 0.25 minutes between the ages of 4 months and 14 yr; in younger infants, the BSP excretion is slower, due probably to hepatic enzyme deficiency, up to a maximum half-life of 9.6 ± 0.77 minutes in 1-10 day-old infants born at term and a somewhat higher value of 11.4 ± 0.62 minutes in 1-10 day-old premature infants. Significantly higher values (delayed BSP excretion) were obtained in 9 children with hepatic dysfunction due to biliary atresia or intoxication, and significantly lower values (accelerated BSP excretion) were obtained in 2 infants (78-82 days old) previously treated with Luminal (30 mg/day for 26 days and 90 mg/day for 10 days, resp.); the latter finding (half-life of 3.3-3.4 minutes) is ascribed to induction of hepatic enzymes under the influence of barbiturates. Among 10 infants subjected to exchange transfusions for hemolytic disease of the newborn, 3 between the ages of 11 and 20 days showed normal BSP excretion (half-life of 8.2-8.9 minutes) and 7 between the ages of 1 and 10 days showed slightly delayed BSP excretion (half-life of 12.3 ± 1.1 minutes). The recommended dosage of BSP is 10 mg/kg i.v., followed 8-20 minutes after the injection by the taking of 4-5 blood samples. Since BSP excretion is proportional to concentration, a straight line is obtained when concentration is plotted against time on semi-log paper. The half-life, which can be read directly from the graph, is independent of body size or weight and is therefore more suitable than BSP retention as a measure of liver function.

4848 HEPATIC PHARMACORADIOLOGY. *(Fr.)*

Bernard, A., P. Lamelin and Leleu-Walle. *J Sci Med Lille* 86(5):359-363, 1968.

Experiments are reported which indicate that successful visualization of the hepatic circulation depends on a number of interacting factors: the viscosity of the contrast medium, changes in caliber of the vessels, and the condition of the parenchyma. Visualization of the parenchyma can be achieved by diluting the contrast medium with alcohol, which lowers the viscosity, and simultaneously adding atropine, which dilates the arteriolo-capillary junctions and counteracts the vasoconstrictive effect of alcohol. A suitable mixture for splenoportography is 30 ml of Vasurix 50 + 5 ml of 0.3% alcohol + 0.5 mg atropine sulfate which results in parenchymal opacification lasting 2-5 minutes, without complications. Alcohol alone (0.3% in Vasurix 25 intraportally) was found to yield only a diffuse hepatic shadow due to retraction of the liver caused by spasm of the portal capillaries. The portal circulation can be visualized readily by intraportal injection of Vasurix + atropine, while addition of alcohol eliminates opacification of the portal tree and replaces it by visualization of the parenchyma. Vasoconstrictors such as prostigmine (6 ml Vasurix 50 + 0.25 mg prostigmine) are unsuitable for hepatography due to interruption of the splanchnic flow, similar to the effect of alcohol alone. However, results similar to those with Vasurix + atropine can be obtained by injecting Vasurix + glucose, Vasurix + essence of terebenthine, or Vasurix + alcohol preceded 4 days earlier by 0.2 ml of dilute HCl (1:3). Excellent results in evaluating the effect of such toxins as pathogenic *E. coli* on the liver can be obtained by a combination of pharmacohepatography and photographic enlargement of the hepatograms.

4849 EVALUATION OF THE VIABILITY OF DAMAGED SEGMENTS OF SMALL INTESTINE BY MEANS OF INTRAOPERATIVE INTESTINAL ELECTROMYOGRAPHY: EXPERIMENTAL STUDIES WITH THE FIRST CLINICAL APPLICATIONS. *(Ger.)*

Schamaun, M. (Surg. Clin. A, U. Zurich, Switzerland). *Helv Chir Acta* 35(1/2) 284-288, 1968.

Electromyographic studies of the small intestine in both dogs and humans showed that the electromyogram consists of 3 types of electrical activity: regular slow waves of low amplitude in the resting state, scattered spikes accompanying weak contractions, and salvoes of spikes accompanying active peristalsis. When the mesenteric arteries and veins were clamped in dogs, the intestinal slow waves generally decreased in frequency within 5-18 hours, but recovered in 15-20 minutes after the clamp was released. These studies showed that prolonged disappearance of electrical activity is a sign of tissue necrosis. Although the mechanical activity of the small intestine can be estimated from the frequency of spikes, the slow waves are more significant in evaluating intestinal viability. Their frequency and amplitude are decreased by every injury to the intestinal wall, but the intestinal segment can be considered viable if the disappearance of electrical activity is reversible when circulation is restored. Preliminary studies in 7 patients (3 men and 4 women, 39-70 yr old) with a variety of disorders (obstructive jaundice due to hepatic carcinoma, ileal metastases from sigmoid cancer, ileal infarction or strangulation, postoperative ileus, and small bowel necrosis due to cardiovascular disease) indicate that intestinal electromyography may be useful in cases of intestinal strangulation, incarceration, volvulus or mesenteric vascular disease to determine, on the operating table, whether or not a particular intestinal segment should be resected.

4850 THE SPECIFICITY OF THE METHOD FOR DETECTING AND DETERMINING INTRINSIC FACTOR USING A SEGMENT OF GUINEA PIG INTESTINE. *(Fr.)* Nicolas, J. P. (Fac. Med., U. Nancy, France) and R. Wolff. *C R Soc Biol (Paris)* 161(12):2588-2590, 1968.

Studies with saliva obtained from H-secreting and nonsecreting subjects of blood type O showed that the determination of intrinsic factor on the basis of the fixation of vitamin B_{12} by a guinea pig ileal segment is unaffected by the substances present in the saliva of H secretors, so that this technique can be considered specific for intrinsic factor. Addition of saliva obtained from H secretors resulted in no significant fixation of ^{57}Co-vitamin B_{12} by a guinea pig ileal segment, regardless of whether the vitamin B_{12} was partially free or entirely bound to excess salivary factor R. This is in contrast to the stimulation of vitamin B_{12} fixation by guinea pig intestinal homogenates upon addition of saliva from H secretors.

4851 CONCENTRATION OF AMYLASE IN SERUM AFTER PANCREATIC STIMULATION WITH A TEST MEAL. *(E.)* Elfström, J. (Serafimer Hosp., Stockholm, Sweden) and G. Lundh. *Scand J Gastroent* 3(4):383-386, 1968.

The serum amylase concentration and the trypsin concentration in the duodenum were estimated just before and up to 2 hr after administration of a standardized test meal in 17 normal persons, 10 patients with pancreatic carcinoma, 12 with acute recurrent or chronic pancreatitis, and 8 with biliary tract lithiasis. Pathological serum amylase values were found in 1 patient with pancreatic carcinoma, 4 patients with pancreatitis, no patients with biliary tract lithiasis, and 4 controls. The number of false negative and false positive results was thus rather large. Serum amylase determinations during digestion of a standardized test meal cannot be used alone as a reliable method for the diagnosis of pancreatic carcinoma and chronic or recurrent pancreatitis.

4852 PANCREATIC BIOPSY. *(E.)* Forsgren, L. (Serafimer Hosp., Karolinska Inst., Stockholm, Sweden), K. Hansson, G. Lundh and H. Nordenstam. *Acta Chir Scand* 134(6):457-460, 1968.

Pancreatic biopsies were taken during operation from 50 patients (31 males and 19 females, 14-86 yr old) with various pancreatic diseases (18 wedge resections and 32 puncture biopsies), the principal symptom of which was obstructive jaundice (38 cases). One false negative diagnosis was obtained among 38 cases of later-verified pancreatic carcinoma, and one false positive cancer diagnosis was obtained in 12 cases which, according to the follow-up, did not have cancer. Pancreatic abscess (1 case) was the only complication definitely attributable to the biopsies. A pancreatic biopsy is highly recommended before the decision is made to proceed with radical pancreatic surgery.

4853 BILE ACID CONJUGATION IN HUMAN LIVER HOMOGENATES OBTAINED FROM PERCUTANEOUS BIOPSIES. *(E.)* Scherstén, T. (Sahlgrenska Hosp., Göteborg, Sweden), A. Gottfries and P. H. Ekdahl. *Acta Chir Scand* 134(6):449-452, 1968.

To evaluate the accuracy of the determination of bile acid conjugation in homogenates from percutaneous liver biopsies, the synthesis of bile acid conjugates in homogenates obtained from percutaneous liver biopsies was compared with the corresponding synthesis in homogenates obtained from operative biopsies in 14 patients (6 men and 8 women, 22-61 yr old) with normal liver function (uncomplicated cholelithiasis) and in 6 patients (2 men and 4 women, 37-80 yr old) with acute cholecystitis or obstructive jaundice due to choledocholithiasis. The percutaneous biopsies were obtained immediately prior to the operative biopsies in all patients. A sufficient amount of liver tissue was obtained from the percutaneous biopsy procedure; however, the synthesis of bile acid conjugates/mg protein in the homogenates was only one-tenth that found in homogenates obtained from operative biopsies. The range of variation in the percutaneous liver biopsy specimens at all concentrations of substrate used was 3-4 times larger than the corresponding values for operative biopsies. The reasons for this difference were not clear. It is felt that the determination of bile acid conjugation in percutaneous liver biopsy specimens, unlike the case with operative biopsy specimens, has little to offer in clinical and scientific work.

4854 MEASUREMENT OF INTESTINAL FAT ABSORPTION WITH CARBON-14 LABELED TRACERS. *(E.)* Kaihara, S. (Johns Hopkins Med. Inst., Baltimore, Md.) and H. N. Wagner Jr. *J Lab Clin Med* 71(3): 400-411, 1968.

In 36 normal volunteers, 20 patients with gastrointestinal diseases (including 14 patients with malabsorption syndrome), and 6 subjects with neomycin-induced steatorrhea, intestinal fat absorption was studied both by means of orally administered ^{14}C-tripalmitin and by chemical determination of fecal fat. The ^{14}C-tripalmitin study was performed 1-3 days after the collection of stools for fecal fat determination. In most of the subjects, expired air was sampled at hourly intervals for 8 hr and at 24 hr after the oral administration of 5 μC of glycerol tripalmitate-1-^{14}C with 1 g of Lipomul/kg body weight. The maximum specific activity of CO_2 in the expired air 3-5 hr after the administration of the test dose correlated with chemical determinations of fecal fat (correlation coefficient of -0.81). This test is technically easy to perform and avoids the necessity of collecting feces or blood.

4855 **DETECTION OF THE ZOLLINGER-ELLISON SYNDROME: THE RADIOLOGIST'S RESPONSIBILITY.** *(E.)* Zboralske, F. F. (U. California Sch. Med., San Francisco) and J. R. Amberg. *Amer J Roentgen* 104(3):529-543, 1968.

The characteristic X-ray features of the small intestine in the Zollinger-Ellison syndrome are described on the basis of experience with 17 patients (14 adults and 3 children), 16 of whom such features preoperatively. The most important diagnostic features included megaduodenum, pronounced edema of the duodenum, jejunum and occasionally the ileum, and increased intraluminal fluid. In addition, the proximal jejunum was usually dilated; in some cases, dilatation may be noted throughout the jejunum. In association with gastrointestinal ulceration, these features are highly specific for the Zollinger-Ellison syndrome.

4856 **DRIP INFUSION CHOLANGIOGRAPHY.** *(E.)* Payne, R. F. (Bristol Royal Infirm., England). *Clin Radiol* 19(3):291-295, 1968.

Drip infusion cholangiography was performed on 25 patients (10 men and 15 women, 26-76 yr old) using 30% dextrose (250 ml) and Biligrafin Forte (60 ml) given i.v. over 1 hr. The results were compared with those in 25 patients (5 men and 20 women, 20-74 yr old) examined by conventional i.v. cholangiography with 20 ml of the same contrast medium. Drip infusion cholangiography resulted in a significantly better demonstration of the gallbladder than the injection of 20 ml Biligrafin i.v. In 4 patients, oral cholecystography and i.v. injection failed to demonstrate the gallbladder. The infusion examination not only outlined the gallbladder but in a few cases demonstrated nonopaque calculi to be present. The infusion of a large volume of contrast medium resulted in the excretion of a large volume of bile-containing contrast medium for a longer period than the standard procedure. This enables all but the most scarred and contracted gallbladders to show some filling of the lumen unless the cystic duct is blocked.

4857 **STUDIES ON THE SOURCE AND SIGNIFICANCE OF BLOOD AMMONIA. III. EFFECTS OF ALTERING BLOOD AMMONIA CONCENTRATION AND HEMATOCRIT ON THE DISTRIBUTION OF AMMONIA.** *(E.)* Conn, H. O. (Yale U. Sch. Med., West Haven, Conn.). *Yale J Biol Med* 41(1):33-49, 1968.

The effects of altering blood ammonia concentration and red cell volume on the distribution of ammonia between plasma and erythorcytes was investigated under controlled conditions. Studies with increasing and decreasing blood ammonia levels *in vivo* and *in vitro* revealed that increments of ammonia were distributed uniformly between plasma and red cells independent of the pre-existing blood ammonia concentration or its distribution. Hematocrit reduction *in vitro* caused an absolute increase in erythrocyte ammonia concentration and an increase in the erythrocyte-plasma ammonia concentration gradient independent of the ammonia concentration of the whole blood. The effect of pH on ammonia distribution in blood is currently under investigation.

4858 **REFLUX PANCREATOGRAPHY: AN EVALUA- TION OF CONTRAST AGENTS FOR STUDYIN THE PANCREAS.** *(E.)* Waldron, R. L. II. (Columbia-Presbyterian Med. Ctr., New York City). *Amer J Roentgen* 104(3): 632-640, 1968.

Duodenotomy and pancreatic duct cannulation were performed in dogs in order to test various types of contrast media for use in pancreatography. Contrast material mixed with duodenal contents was infused through the cannula at a pressure of 1500 mm H_2O. Serum amylase determinations were made prior to operation and daily for 5 days following the procedure. Animals were sacrificed on the 5th postoperative day and pancreatic sections were studied microscopically. When Barosperse was used in 4 animals, the total amount of contrast material that passed into the pancreatic ducts ranged from 0.8 to 2.2 cc With 37% ethiodized oil (Ethiodol) in 4 animals, the infusion was stopped after instillation of 4 cc. With both agents, pancreatic duct visualization was excellent, and at necroscopy, significant amounts of the contrast materials were found in the pancreas. However, moderate to severe pancreatitis was eviden in all animals. In 4 animals, pancreatograms of diagnostic quality were produced when 5 cc of 50% sodium diatrizoate (Hypaque) were allowed to enter the ductal system. It was demonstrated that this agent passed through the pancreas rapidly and was excreted by the kidney, also producing a pyelogra The inflammatory response in the pancreas was much less seve than with the other agents. The retrograde pancreatic passage of Hypaque was believed to occur through a ducto-interstitial-venous pathway. Water-soluble agents such as Hypaque are the contrast media of choice in reflux pancreatography. The technique is safe and produces satisfactory diagnostic results.

4859 **A SIMPLIFIED METHOD FOR ESTIMATING PLASMA TRIGLYCERIDES: THEIR STABILIT DURING COLD STORAGE.** *(E.)* Lloyd, M. R. (John Curtin Sch. Med. Res., Australian Natl. U., Canberra) and R. B. Goldrick. *Med J Aust* 2(12):493-496, 1968.

A simplified method is described for the measurement of plasma triglycerides. The method was developed by combinin several relatively simple techniques for extracting plasma lipid removing phospholipids, and saponifying triglycerides to provi quantitative yields of triglyceride-glycerol for subsequent determination by periodate oxidation. The method has been validated for use over a wide range of plasma triglyceride concentrations and is not affected by high concentrations of phos pholipids. Observations on the stability of plasma triglyceride have indicated that heparinized blood samples may safely be left at room temperature for up to 2 hr before the cells are separated. Plasma samples can be satisfactorily stored at eithe 4C or -20C for up to 8 weeks. Repeated thawing of frozen samples does not influence the measured triglyceride levels.

4860 **ELECTROCARDIOGRAPHIC CHANGES DURIN ROUTINE SIGMOIDOSCOPY.** *(E.)* Fletcher, G. F. (Emory U. Sch. Med., Atlanta, Ga.), D. L. Earnest, W. F Shuford and N. K. Wenger. *Arch Int Med* 122(6):483-486, 19

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elecardiographic monitoring was performed during routine igmoidoscopy in 100 patients (40 with heart disease and 60 ithout). Electrocardiographic changes in rhythm, depolarizaion and repolarization occurred in both groups of patients. here was a significantly greater frequency (40% vs 17%) in the evelopment of or increase in ectopic beats in those patients ith heart disease; however, no catastrophic arrhythmias ocurred. These findings do not contraindicate sigmoidoscopy ither in patients with or without heart disease, but the poential hazard of cardiac arrhythmias must be taken into conideration.

861 THE INFLUENCE OF EXTRABILIARY PERITONITIS ON CHOLECYSTOGRAPHY. *E.)* Warren, A. (Montefiore Hosp. Med. Ctr., Bronx, N. Y.), . C. Beneventano and C. J. Schein. *Amer J Surg* 116(6): 72-874, 1968.

he problem of biliary visualization in the presence of extrailiary peritonitis was investigated in 9 adult mongrel dogs to stablish the clinical reliability of cholecystography in the diferential diagnosis of acute abdominal conditions. Cystography ith i.v. methylglucamine iodipamide was carried out before nd after surgical establishment of extrabiliary peritonitis of hree types: sterile, colonic, and pancreatic. Gallbladder isualization occurred in all animals regardless of the extent nd duration of peritonitis. This study indicates that visualization of the gallbladder by i.v. cholangiography is a reliable method for demonstrating that the gallbladder is not the source f a coexistent peritonitis.

862 *IN VITRO* COMPARATIVE EVALUATION OF METRONIDAZOLE AND OTHER ANTI-MOEBIC DRUGS AGAINST *ENTAMOEBA HISTOLYTICA.* *E.)* Grewal, M. S. (Postgrad. Inst. Med. Educ. Res., handigarh, India). *Indian J Med Res* 56(5):646-653, 1968.

omparative *in vitro* studies of several amebicidal and antilagellar drugs were carried out against *Trichomonas hominis* nd 24-48 hr cultures of *Entamoeba histolytica* isolated from atients with acute dysentery. Metronidazole (Flagyl) was found o be effective against *E. histolytica* and *T. hominis* within 24-48 hr at concentrations of 0.1-1.0 μg/ml. Against *E. istolytica,* metronidazole was more effective than phanquone Entobe) and equally as effective as iodochlorhydroxyquin nd diloxanide furoate; emetine was less effective at higher concentrations but more effective at lower concentrations. Against *I. hominis,* metronidazole was more effective than any of the other drugs.

4863 ORAL MAINTENANCE OF WATER-ELECTROLYTE AND ACID-BASE BALANCE IN CHOLERA: A PRELIMINARY REPORT. *(E.)* Pierce, N. F. (Calcutta Sch. Trop. Med., India), J. G. Banwell, R. C. Mitra, G. J. Caranasos, R. I. Keimowitz, A. Mondal and P. M. Manji. *Indian J Med Res* 56(5):640-645, 1968.

Two solutions containing 118 or 110 mEq/1 sodium, 8.5 or 9.0 mEq/1 potassium, 86.5 or 79.0 mEq/1 chloride, 40 mEq/1 bicarbonate, and 40 or 160 mM/1 glucose were administered intragastrically to 9 male cholera patients to determine the efficacy of various glucose concentrations in maintaining water, electrolyte and acid-base balance. Absorption of water and electrolytes was evaluated by determinations of plasma concentrations and fecal losses over a 12-hr period. Increasing the glucose concentration from 40 to 160 mM/1 significantly reduced the fluid required to maintain balance, indicating that a larger portion of the solution was absorbed than was excreted. The data demonstrate that the gut retains its capacity for active glucose absorption in the presence of severe diarrhea. It is evident that orally administered glucose-electrolyte solutions are valuable in the management of clinical cholera.

4864 INFUSION CHOLANGIOGRAPHY: THIRTEEN YEARS EXPERIENCE WITH 1,600 CASES. *(E.)* Cooperman, L. R. (Sequoia Hosp., Redwood City, Calif.), S. B. Rossiter, G. W. Reimer and E. Ng. *Amer J Roentgen* 104(4): 880-883, 1968.

Based on experience with 1600 patients, drip infusion cholangiography with iodipamide methylglucamine is concluded to be the method of choice for i.v. cholangiograph. The technique is safe, almost completely free of untoward reactions, easy to perform, time saving, and makes this valuable procedure extremely convenient in a busy radiology department. Mild nausea, vomiting, itching and hires are occasional to very rare complications. The use of larger doses of contrast medium, slower infusion times and larger volumes of infusing solution provide only a minimal improvement in bile duct opacity, and this must be wieghed against the prolonged time required to complete the examination. Generally, poor visualization is an indication of either hepatocellular disease or biliary tract obstruction.

4865 ASCITES AND DIURETICS. [EDITORIAL]. *(Fr.)* Demanet, J. C. (St. Pierre U. Hosp., Brussels, Belgium). *Acta Gastroent Belg* 31(1):7-10, 1968.

4866 THE EARLY DIAGNOSIS OF CARCINOMA OF THE PANCREAS. *(Ger.)* Körbler, J. (Inst. Oncol., Zagreb, Yugoslavia). *Krebsarzt* 23(2):32-36, 1968.

4867 RADIOLOGICAL EVALUATION OF INFLAMMATORY TUMORS OF THE LARGE INTESTINE. *(Pol.)* Szczepanski, J. (Munic. Hosp., Biala Podlaska, Poland). *Wiad Lek* 21(9):763-769, 1968.

4868 BIOPSY OF THE SMALL INTESTINE. *(Ger.)* Massewitsch, C. (Inst. Sanit. Hyg., Leningrad, USSR). *Deutsch Z Verdau Stoffwechselkr* 27(3/4):69-76, 1967.

4869 X-RAY EXAMINATION OF THE STOMACH FOLLOWING VAGOTOMY, PYLOROPLASTY AND PARTIAL RESECTION. *(Ger.)* Thiemann, K. J. (Johanniter Hosp., Rheinhausen, Germany). *Deutsch Med Wschr* 93(27):1327-1328, 1968.

4870 DIFFICULTIES IN THE DIAGNOSIS OF ACUTE MECKEL'S DIVERTICULITIS IN WOMEN. *(Pol.)* Bloniecki, J. (PKP Hosp., Olsztyn, Poland), D. Bloniecka and R. Czekanowski. *Wiad Lek* 21(9):727-730, 1968.

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4871 THE X-RAY DIAGNOSIS OF INDEPENDENT BILIO-DIGESTIVE FISTULAS. *(Pol.)* Sitkowski, W. (Munic. Hosp. No. 6, Warsaw, Poland), I. Pronaszko-Rzepecka, J. Szymanowski and K. Wermenski. *Pol Przegl Radiol* 32(4): 445-451, 1968.

4872 APPLICABILITY OF THE ACHOLEST TEST IN THE COURSE OF VIRAL HEPATITIS. *(Pol.)* Sowa, J. (Infect. Dis. Clin., Acad. Med., Krakow, Poland) and K. Zasowska. *Przegl Epidem* 22(2):237-242, 1968.

4873 THE DIAGNOSTIC VALUE OF FECAL BILE PIGMENT DETERMINATIONS IN ELUCIDATING THE PATHOGENESIS OF VARIOUS TYPES OF JAUNDICE. *(It.)* Napolitano, A. (Inst. Surg. Path., U. Rome, Italy), G. Tumino and E. Maggiore. *Gazz Int Med Chir* 73(15):1289-1304, 1968.

4874 NEW DRUGS IN PREMEDICATION FOR GASTROSCOPIC EXAMINATION. *(Hun.)* Wittman, I. (8th Distr. Balassa János Hosp., Budapest, Hungary), E. Toóth and M. Trebitsch. *Magy Belorv Arch* 21(4)Suppl.: 51-55, 1968.

4875 A SIMPLE METHOD FOR THE DIAGNOSIS OF EXOCRINE PANCREATIC INSUFFICIENCY: DETERMINATION OF THE MAXIMUM BICARBONATE OUTPUT DURING CONTINUOUS PERFUSION WITH SECRETIN. *(Fr.)* Ribet, A. (Purpan Hosp., Toulouse, France), J. P. Pascal and N. Vaysse. *Acta Gastroent Belg* 31(1):11-18, 1968.

4876 THE USE OF COLOR GASTROPHOTOGRAPHY IN THE DIAGNOSIS OF STOMACH DISEASES. *(Rus.)* Sokolov, L. K. (Lab. Gastroent., Acad. Med. Sci. USSR, Moscow). *Klin Med (Moskva)* 46(7):85-90, 1968.

4877 THE USE OF BARIUM SULFATE SUSPENSIONS IN THE DIAGNOSIS OF ACUTE DISEASES OF THE SMALL INTESTINE. *(E.)* Nelson, S. W. (Ohio State U. Hosp., Columbus) and A. J. Christoforidis. *Amer J Roentgen* 104(3):505-521, 1968.

4878 CONTEMPORARY TECHNIQUES FOR THE STUDY AND DIAGNOSIS OF CHRONIC PANCREATITIS. *(Rus.)* Kozlov, I. Z. (I. M. Sechenov 1st Moscow Med. Inst., USSR) and V. I. Sokolov. *Sovet Med* 31(8):3-9, 1968.

4879 A MODIFIED METHOD OF DETERMINING ALKALINE PHOSPHATASE ACTIVITY FOR THE DIAGNOSIS OF DISEASES OF THE LIVER AND BILE DUCTS. *(Rus.)* Kolmakov, V. N. (Leningrad Sanit.-Hyg. Med. Inst., USSR), V. A. Kuleba and N. N. Chamin. *Sovet Med* 31(8):58-61, 1968.

4880 THE LACTOSE TOLERANCE TEST IN THE DIAGNOSIS OF INTESTINAL LACTASE DEFICIENCY. *(Sp.)* Valenzuela, J. (San Francisco de Borja Hosp., Santiago, Chile) and N. C. Hightower. *Rev Med Chile* 96(4):221-226, 1968.

4881 GASTRIC SECRETION: TECHNIQUES FOR THE MEASUREMENT OF GASTRIC ACIDITY. *(Sp.)* Valenzuela, J. (San Francisco de Borja Hosp., Santiago, Chile), M. Petermann, I. Gruzat and G. Ugarte. *Rev Med Chile* 96(4):234-239, 1968.

4882 GASTRIC BIOPSY: A STEP FORWARD IN THE DIAGNOSIS OF GASTRIC NEOPLASMS. *(Fr.)* Vosse-Matagne, G. (Inst. Med., U. Liege, Belgium) and P. Chevalier. *Rev Med Liege* 23(15):445-450, 1968.

4883 BISMUTH PHOSPHATE IN GASTROINTESTINAL THERAPY. *(Fr.)* Darnaud, C. and R. Voisin. *Rev Med Toulouse* 4(6):749-757, 1968.

4884 CHOLECYSTOGRAPHY IN PATIENTS TREATED WITH METHOCLOPRAMIDE: CLINICAL EXPERIMENTATION. *(It.)* Barberis, S. (Charity Hosp., Alessandria, Italy), A. Bissanti, L. Franco and G. Furlotti Marino. *Rass Int Clin Ter* 48(11):663-672, 1968.

4885 STUDIES OF BLOOD COAGULATION DURING HEPATIC DISEASES IN CHILDHOOD. *(Ger.)* Tschäppeler, H. (Pediat. Clin., U. Bern, Switzerland) and E. Gugler. *Z Kinderheilk* 103(4):349-364, 1968.

4886 RADIOLOGY AND LAPAROSCOPY IN OBSTRUCTIVE JAUNDICE. *(Rus.)* Volkova, L. P. (Leningrad Sanit.-Hyg. Med. Inst., USSR) and M. A. Laper'ie. *Vestn Khir Grekov* 100(5):36-40, 1968.

4887 SOME CHANGES IN THE SPLEEN AND MESENTERIC LYMPH NODES FOLLOWING SUPPRESSION OF THE INTESTINAL FLORA BY ANTIBIOTICS IN WHITE MICE. *(Rus.)* Zykov, I. N. (N. F. Gamaleia Inst. Epidemiol. Microbiol., Moscow, USSR). *Antibiotiki* 13(9):824-827, 1968.

4888 IMPULSE REFLECTION PASSAGE ULTRASONIC METHOD IN THE DIAGNOSIS OF BILE STONES. *(E.)* Smoldas, J. (Med. Fac., Palacký U., Olomouc, Czechoslovakia). *Cesk Gastroent Vyz* 22(4):268-275, 1968.

4889 VALUE OF THE STREPTOMYCIN TEST IN PERFORATED GASTRODUODENAL ULCERS (PRELIMINARY REPORT). *(E.)* Tesař, O. (Fac. Gen. Med., Prague-Motol, Czechoslovakia) and F. Pavlik. *Cesk Gastroent Vyz* 22(4):250-253, 1968.

4890 THE X-RAY DIAGNOSIS OF CANCER OF THE AMPULLA OF VATER AND EXTRAAMPULLAR CANCER OF THE DUODENUM. *(Rus.)* Mazaiev, P. N. (A. V. Vishnevskii Inst. Surg., Acad. Med. Sci. USSR, Moscow) and A. M. Grishkevich. *Klin Med (Moskva)* 46(7):114-119, 1968.

4891 THE USE OF TETRACYCLIN FLUORESCENCE FOR THE DIAGNOSIS OF STOMACH CANCER. *(Rus.)* Viliavin, G. D. (A. V. Vishnevskii Inst. Surg., Acad. Med. Sci. USSR, Moscow), Ie. A. Govorovich, M. G. Khanin, A. M. Marshak and B. N. Varava. *Klin Med (Moskva)* 46(7): 74-77, 1968.

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4892 **A STUDY OF BROMSULFALEIN CLEARANCE: ABNORMALITIES IN HEPATOBILIARY DISEASES AND THE POSSIBILITY OF INDEPENDENT BSP PATHOLOGY.** *(Fl.)* Ramboer, C. (St. Rafael Acad. Hosp., Louvain, Belgium) and J. De Groote. *T Gastroent* 11(1):36-52, 1968.

4893 **THE VALUE OF PANCREATIC ARTERIOGRAPHY IN CANCER OF THE PANCREAS.** *(Fr.)* Honjo, I. (Fac. Med., U. Kyoto, Japan), T. Suzuki and G. Yoshitomi. *Lyon Chir* 64(4):587-595, 1968.

4894 **A PRELIMINARY NOTE ON USEFUL TECHNIQUES OF PANCREATIC SCINTIGRAPHY.** *(It.)* Pozza, F. (Inst. Radiol., U. Padua, Italy), S. Romani and R. Ravasini. *G Veneto Sci Med* 22(Suppl.):357-360, 1967.

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4963 **QUANTITATIVE DETERMINATIONS OF THE IMMUNOGLOBULINS IN INFLAMMATORY DISEASES OF THE LIVER.** *(Ger.)* Gleichmann, E. (Oststadt Hosp., Hannover Germany) and H. Deicher. *Aktuel Gastroent* pp. 349-351. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

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4968 **TRAINING FOR GASTROINTESTINAL RADIOLOGY.** *(E.)* Amberg, J. (San Francisco Med. Ctr., U. of California). *Gastroenterology* 55(6):730-731, 1968.

4969 **THE POLYPOSITIONAL X-RAY TELEVISION AND X-RAY CINEMATOGRAPHIC STUDY OF THE ESOPHAGUS.** *(Rus.)* Rabkin, I. Kh. (Sci.-Res. Inst. Clin. Exp. Surg., Min. Health, Moscow, USSR) and G. A. Daniielian. *Khirurgiia (Moskva)* 44(2):103-109, 1968.

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4970 **AMEBIASIS IN NORTHERN SASKATCHEWAN: PATHOLOGICAL ASPECTS.** *(E.)* Miller, M. J. (Montreal Gen. Hosp., P. Q., Canada), W. H. Mathews and D. F. Moore. *Canad Med Ass J* 99(14):696-705, 1968.

Five fatal cases of amebiasis in Indians from the Loon Lake area of Northern Saskatchewan are described. The patients ranged in age from 1 to 83 yr; 4 had amebic ulcerative colitis and 1 had an amebic liver abscess. Specific chemotherapy was delayed until it was apparently no longer possible to alter the fatal outcome of the disease. This was due either to the late presentation of patients for medical care or to the possibility of amebic infection not having been considered sufficiently early by the medical attendants. The classic flask-shaped ulcer with its broad base in the submucosa and narrow opening formed by the overhanging margins of the mucous membrane was commonly seen. More extensive lesions with invasion and destruction of muscle layers were also noted. Where penetrating lesions undermining the muscle coats were seen, entire layers of the bowel were separated off and sloughed away. The end results of necrosis of all bowel layers, where the thickened, inflamed mesentery remained as the sole barrier to perforation, were likewise noted. Amebic invasion of the mucous membrane was seen only where there was damage to tissue, usually at the margins of deeper ulcers. A study of lesions in 1 case showed that the amebae were confined almost entirely to the lesions and were often concentrated at or near the periphery. The distribution was felt to represent an accurate picture of the *in vivo* positions of these parasites.

4971 **AMEBIASIS IN NORTHERN SASKATCHEWAN: RADIOLOGICAL ASPECTS.** *(E.)* Tchang, S. (U. Hosp., Saskatoon, Saskatchewan, Canada). *Canad Med Ass J* 99(14):688-695, 1968.

The radiological aspects of 43 patients with amebiasis are presented. Of the 43 patients, 33 had amebic colitis, and 26 of these were investigated by barium enema. Cecal deformity was the most important feature and was present in 8 of the 26 patients examined. However, it varied greatly in degree and only 3 patients had the "coned-cecum" appearance which is considered a classical feature of this disease. Segmental involvement (skip areas) were radiologically evident in the rectum, sigmoid, and transverse colon, with or without cecal involvement. This finding occurred more often in long-standing cases and was seen in 12 of the 26 patients. Marginal ulceration and a shaggy appearance of the colonic contour was seen in 13 patients. No amebomata were seen. In the diagnosis of amebic colitis, carcinoma, tuberculosis, Crohn's disease of the colon, ulcerative colitis, actinomycosis, and ischemic lesions of the colon must be excluded. In 9 of 10 patients with amebic liver abscess, abnormal findings were seen in the chest. The combination of liver enlargement and chest abnormalities was suggestive but not pathognomonic of the disease.

4972 **GASTROINTESTINAL COMPLICATIONS IN BURNS.** *(E.)* Kirksey, T. D. (Brooke Army Med. Ctr., Fort Sam Houston, Texas), J. A. Moncrief, B. A. Pruitt and J. A. O'Neill Jr. *Amer J Surg* 116(5):627-633, 1968.

A retrospective study of 1291 burn patients revealed a total of 322 gastrointestinal complications, an overall incidence of 25%. Esophageal lesions were of 2 principal types: 1) linear ulcerations at the upper and lower portions of the esophagus due to prolonged indwelling nasogastric tubes, and 2) reflux esophagitis. Tubes should be removed as soon as possible. Hemorrhagic gastritis was seen in 36 cases, principally in patients with extreme thermal injury and early death. Curling's ulceration of the stomach and duodenum was the most prevalent problem (174 cases, an incidence of 13.5%) and was related to the magnitude of the burn and to a decrease in gastric mucus production. Perforation and severe hemorrhage were found to require hemigastrectomy and vagotomy; conservative treatment was not effective. Acute cholecystitis was seen in 9 cases, 7 without evidence of calculi. Dehydration and stagnation of bile with precipitation of irritative bile salts, reflux of pancreatic juice and the use of narcotics to alleviate pain appeared to be the most likely explanations for acalculous acute cholecystitis. Pancreatitis not associated with the localized pancreatitis seen with posterior penetrating gastric or duodenal ulcers was seen in 12 cases, without apparent cause. Nonoperative treatment is recommended. Severe weight loss with duodenal obstruction by the superior mesenteric artery was seen in 4 cases and was successfully managed by duodenojejunostomy. Small and large intestine involvement was seen in 33 cases, the most common lesion being acute necrotizing enterocolitis. Conventional treatment was effective. A keen awareness of the potential hazard of gastrointestinal complications after thermal injury is the key to successful management.

4973 **AMEBIASIS IN NORTHERN SASKATCHEWAN: CLINICAL ASPECTS.** *(E.)* Buchan, D. J. (U. Hosp., Saskatoon, Saskatchewan, Canada). *Canad Med Ass J* 99(14):683-688, 1968.

Clinical experience with 33 cases of amebic infection of the colon and 10 cases in which the liver was involved is presented. Almost all patients (39 of 43) were Indians and 38 came from the Loon Lake area. More females than males were seen with colitis (20 of 33) but more men (8 of 10) developed a liver abscess. The rectal mucosa was diffusely involved in half the colitis group while the remainder showed discrete ulcers. Serum albumin levels of less than 3.0 g/100 ml were found in 23 patients, with an average of 1.9 g/100 ml in the patients with abscess. Isotopic liver scans and indirect hemagglutination tests were useful in the diagnosis of a liver abscess. Complications included toxic megacolon, massive rectal bleeding, peritonitis, hypokalemia and empyema. Colectomy was performed in 2 patients and defunctioning ileostomy in 1. Treatment with emetine was more effective than with tetracycline. There were 5 deaths from colitis and 1 from abscess. This relatively high mortality was mainly the result of delayed treatment. Clinical suspicion of amebiasis in patients from unusual geographic locations and proper identification of amebae should reduce the mortality.

4974 **CHANGING PATTERN OF TYPHOID FEVER.** *(E.)* Gulati, P. D. (Maulana Azad Med. Coll., New Delhi, India), S. N. Saxena, P. S. Gupta and H. K. Chuttani. *Amer J Med* 45(4):544-548, 1968.

A prospective clinical and microbiological study was carried out in 98 cases of typhoid fever over an 18-month period. The diagnosis was made by positive blood culture or by rising Widal agglutination titers. In 82% of the patients, the disease presented with insidious onset of fever accompanied by constitutional symptoms in the 1st or 2nd week; in the remaining 18% the illness started abruptly with atypical features such as acute gastroenteritis, hemiplegia and hematuria. Clinical features included moderate to high continuous or remittent pyrexia in 54%, intermittent pyrexia in 46%, bronchitic chest signs in 50%, encephalopathy in 44%, and splenic enlargement in 38%. Rose spots and relative bradycardia were either absent or rare. Complications developed in 41 patients, notably circulatory failure (61%) and encephalopathy (35%); 13 patients died of these. Widal agglutination titers (TO and TH) above 1/200 were noted in 22 of 57 patients admitted in the 1st week, 23 of 28 patients admitted in the 2nd week, and 11 of 13 patients admitted in the 3rd week. Blood cultures were positive in 46 cases (29 in the 1st week, 12 in the 2nd week, and 5 in the 3rd week of illness). Improvement occurred with chloramphenicol. Fever and toxemia settled within 3 to 5 days; encephalopathic manifestations persisted in 6 patients for 2 to 4 weeks. Agglutination titers were raised or remained the same in the majority of patients. The effect of chloramphenicol on agglutination titers was variable, while corticosteroids usually depressed the titers. The blood culture became sterile in all but 1 resistant case.

4975 **THE FATE OF TANTALUM STAPLES USED IN DIGESTIVE TRACT ANASTOMOSES.** *(Rus.)* Kalinina, T. V. (Sci.-Res. Inst. Surg. Appar. Instr., Moscow, USSR). *Khirurgiia (Moskva)* 44(2):97-100, 1968.

The value of tantalum staples for mechanical suturing of the esophagus and gastrointestinal tract was confirmed by clinical, radiological and histological studies on 303 animals, 163 patients operated on by the author and her colleagues, and 1083 patients operated on in other institutions. The experimental results showed that tantalum staples produce less inflammation than silk or catgut sutures, and do not impede tissue regeneration. In end-to-end or end-to-side anastomoses involving the small intestine, these staples cut through the mucosa after about 12 days and are passed naturally between 2 and 12 months postoperatively, while in the case of side-to-side intestinal anastomoses or anastomoses between the intestine and the gallbladder, no cutting through or passage of the staples is observed. Following mechanical suturing of the esophagus, staples can be found in the esophageal, gastric or intestinal wall one month later, but no inflammation or ulceration is produced. Death due to rupture of the anastomosis occurred in 43 of 907 patients provided with stapled esophageal anastomoses using the PSK-25 device following gastrectomy or resection of the cardia for stomach cancer, in 3 of 253 patients provided with stapled intestino-intestinal anastomoses using the SK device, and in 3 of 86 patients provided with stapled rectointestinal anastomoses using the KTs-28 device following colectomy for cancer of the large intestine or ulcerative colitis.

4976 **INTESTINAL OBSTRUCTION IN INFANCY AND CHILDHOOD.** *(E.)* Taneja, O. P. (Maulana Azad Med. Coll., New Delhi, India), S. Taneja and A. Lal. *Arch Surg* 97(4):544-552, 1968.

A critical analysis of the incidence and etiology of intestinal obstruction is presented on the basis of experience with 88 neonates, infants and children, and the problems of the diagnosis, management and treatment of this condition in India are discussed. Socioeconomic conditions are held responsible for acquired lesions such as those caused by ascariasis, tuberculosis and bezoars. Other causes noted include atresia and stenosis, hypertrophic pyloric stenosis, meconium ileus, errors of rotation, Meckel's diverticulum, intussusception, external hernia, obturation and adhesions. Fluid and electrolyte deficit accounted for most of the 41 deaths (overall mortality 47%). The importance of early diagnosis of intestinal obstruction on the basis of the history, physical examination and X-ray is stressed. With wider recognition of the problems involved and the organization of pediatric surgical units in teaching institutions throughout India, the outlook can be improved.

4977 **PROTEIN METABOLISM IN THE INTESTINAL STAGNANT LOOP SYNDROME.** *(E.)* Jones, E. A. (Royal Free Hosp., London, England), A. Craigie, A. S. Tavill, G. Franglen and V. M. Rosenoer. *Gut* 9(4):466-469, 1968.

The ^{14}C-carbonate method for estimating the rates of synthesis of liver-produced plasma proteins was used to study plasma protein and urea metabolism in a 70-yr-old man with features of severe protein-calorie malnutrition associated with a profuse flora of enteric organisms in the fasting jejunal contents, 10 yr after intestinal anastomosis for small intestinal obstruction. The concentrations of several of the plasma amino acids were low, the rates of synthesis of albumin and fibrinogen were low, the rate of urea synthesis was high, and the proportion of this urea recovered from the urine was low. All of these abnormalities were either partially or completely corrected by the administration of oral antibiotics alone. The data suggest that the growth of enteric organisms in the small intestine may result in deamination of large quantities of dietary protein, resulting in an increased synthesis of urea and the hydrolysis of a large proportion of the urea synthesized. As a result, a large proportion of the dietary nitrogen becomes unavailable for protein anabolism.

4978 **EFFECT OF FIVE SALICYLATE-CONTAINING COMPOUNDS UPON LOSS OF ^{51}CHROMIUM-LABELLED ERYTHROCYTES FROM THE GASTROINTESTINAL TRACT OF NORMAL MAN.** *(E.)* Beeken, W. L. (U. Vermont Coll. Med., Burlington). *Gut* 9(4):475-479, 1968.

Gastrointestinal losses of ^{51}Cr-labelled erythrocytes and whole blood were quantitated in separate studies of 5 groups of 10 normal subjects (age 22-63 yr, 47 males and 3 females) during the ingestion (3-4 times daily for 1 week) of placebo preparations and 5 commonly used salicylate analgesics (acetylsalicylic acid alone or with aluminum glycinate and magnesium carbonate, acetophenetidin and caffeine, acetophenetidin, salicylamide and caffeine, or acetophenetidin, caffeine, citric acid and KCl). Group mean losses were significantly greater during the ingestion of each salicylate than during placebo control periods. Mean erythrocyte losses increased by factors ranging from 3 to 13 during drug ingestion and equivalent blood losses increased from 3 to 11 times during the same period. It is concluded that salicylates produce abnormalities in normal man resulting in increased gastrointestinal erythrocyte and equivalent whole blood losses. Menstruating females with marginal iron stores may develop iron-deficiency anemia if losses of this magnitude are continued, but otherwise such losses could be compensated for in normal subjects.

4979 STUDY OF GASTRODUODENAL ABNORMALITIES IN CHRONIC BRONCHITIS AND EMPHYSEMA.

(E.) Arora, O. P. (Maulana Azad Med. Coll., New Delhi, India), C. P. Kapoor and P. Sobti. *Amer J Gastroent* 50(4):289-296, 1968.

Clinical and radiological investigations were performed in 50 patients with established chronic bronchitis and emphysema in an attempt to detect gastroduodenal abnormalities. Augmented histamine tests were also done in 42 cases and 10 normal controls. It was found that 8% of the cases with chronic bronchitis and emphysema had peptic ulcer and 10% had hypertrophic gastritis and gastroduodenitis. A total of 18% showed gastroduodenal abnormalities. The gastric secretory pattern revealed no significant difference in basal secretion between patients with chronic pulmonary emphysema and normals, although the former group was found to be hypersecretors in response to histamine as compared to normals.

4980 SERUM SIDEROPHILIN IN KWASHIORKOR.

(E.) Antia, A. U. (U. Coll. Hosp., Ibadan, Nigeria), H. McFarlane and J. F. Soothill. *Arch Dis Child* 43(230):459-462, 1968.

Immunochemical studies on 24 Nigerian children with kwashiorkor (9 boys and 15 girls, 1-5 yr old) revealed a mean serum siderophilin level of only 34% of that found in pooled serum from healthy Nigerian adults (150 mg%), compared to 71% in 4 infants with marasmus and 194% in 10 children (0.5-7.0 yr old) with nonnutritional diseases. The siderophilin level correlated poorly with a clinical grading of disease severity, but correlated well with prognosis, with levels of only 4-12.5% in the 6 children who died. The siderophilin level was far more profoundly depressed than the total serum protein (4.5 g% in kwashiorkor compared to 7.5 g% in marasmus), and correlated poorly with the packed cell volume ($r = 0.508$). The defect was rapidly reversible on a high-protein diet. More detailed knowledge of the amino acid requirements for production of each individual protein would be required to permit speculation on the mechanism of this extreme and highly reversible symptom of kwashiorkor.

4981 PRELIMINARY RESULTS OF A STUDY OF SMALL INTESTINAL WATER AND SOLUTE MOVEMENT IN ACUTE AND CONVALESCENT HUMAN CHOLERA.

(E.) Banwell, J. G. (Calcutta Sch. Trop. Med., India), N. F. Pierce, R. Mitra, G. J. Caranasos, R. I. Keimowitz, A. Mondal and P. M. Manji. *Indian J Med Res* 56(5):633-639, 1968.

Isotonic solutions containing 145 or 140 mEq/1 Na^+, 5 or 10 mEq/1 K^+, 140 or 120 mEq/1 Cl^-, and 10 or 30 mEq/1 HCO^-_3 were infused at 8.5-12 ml/min into the jejunum and ileum, resp., of 17 male patients (16-50 yr of age) with acute and convalescent cholera to determine the origin of fecal water and electrolyte loss. The results indicate that diarrhea originates from abnormal water and solute movement across the small bowel mucosa, water and electrolyte loss being greater from the jejunum. A bidirectional flux of Na^+ and water continues even in the active phase of the disease. The magnitude of Na^+ insorption is similar in acute and convalescent patients, indicating that an increased Na^+ outflux is the major factor contributing to Na^+ loss in cholera.

4982 SOME CAUSES OF RECURRENT ABDOMINAL PAIN IN CHILDREN.

(E.) Cochrane, W. A. (Child. Hosp., Halifax, Nova Scotia, Canada). *Canad Fam Phys* 14(8):22-26, 1968.

Children presenting with recurrent abdominal pain during recent years at the Children's Hospital in Halifax (Nova Scotia) have included 7 with recurrent pancreatitis (4 boys and 3 girls, 2-9 yr old, seen between 1963 and 1968) and a large number with duodenal ulcers (54 cases between 1956 and 1962 and about 20 new cases annually through 1965); the 54 children with duodenal ulcers, 30 of whom were admitted in 1962 alone, included 33 boys and 21 girls ranging in age from 25 days to 15 yr (45 between 5 and 15 yr old). All ulcers were confirmed radiologically, and most were considered to be "primary" (due to some disturbance in gastric physiology of unclear etiology, with a possible familial tendency in 30%) rather than secondary to stress, steroid therapy or some underlying disease process such as central nervous system disease or cystic fibrosis. Gastric analysis hyperacidity in only 6 of 15 cases. Except in 2 cases with perforation, the treatment was entirely medical. Follow-up in 24 cases revealed a slow healing process with a tendency to recurrence in response to stressful situations. Among the 7 children with pancreatitis, all had a history of vomiting, 4 had anorexia, 2 had diarrhea, and 3 had abdominal distension; the duration of symptoms varied from 6 months to 4 yr. The etiology, diagnosis and treatment of childhood pancreatitis are discussed in general terms, and the provocative test with morphine sulfate (0.15 mg/kg s.c.) and prostigmine bromide (0.03 mg/kg s.c.) is proposed as a helpful diagnostic procedure. Among 40 children (20 boys and 20 girls, 2-12 yr old, with normal fasting amylase values, including 9 boys and 12 girls with abdominal pain) given the test, 4 girls with histories of abdominal pain showed abnormal responses (more than a 4-fold rise in serum amylase above the normal fasting level). Of these 4, one recovered after treatment of a urinary tract infection and the other 3 improved markedly on low-fat diets. It is concluded that peptic ulcer disease and pancreatitis must be considered by the pediatrician when presented with the problem of recurrent abdominal pain in young children.

4983 EFFECT OF PARTICLE SIZE ON ASPIRIN-INDUCED GASTROINTESTINAL BLEEDING.

(E.) Györy, A. Z. (Royal North Shore Hosp., Sydney, Australia) and J. N. Stiel. *Lancet* 2(7563):300-302, 1968.

In 9 patients without gastrointestinal disease (4 men and 5 women, including 1 man and 5 women with iron-deficiency anemia and a history of fecal blood loss), who acted as their own controls and in whom blood loss was estimated by measuring the fecal loss of ^{51}Cr-labeled erythrocytes, coarse aspirin (mesh size 16) in gelatin capsules (600 mg 4 times/day for 3 days) caused significantly more gastrointestinal bleeding than did fine aspirin (mesh size 120) at the same dosage, also in gelatin capsules. The order in which the two types of aspirin were administered did not affect the results (average blood loss of 1.3 ml/day during the control period, 5.9 ml/day after fine aspirin and 11.0 ml/day after coarse aspirin). The differences observed between aspirin-16 and aspirin-120 (33.3-294.1% increase in blood loss on coarse compared to fine aspirin in 6 of 9 patients) are ascribed solely to the difference in their particle sizes. The mean daily blood loss produced by both types of aspirin was greater in the subjects with a previous history of occult gastrointestinal bleeding than in those with no such history. Although none of these patients had evidence of chronic peptic ulceration, these findings agree with previous data which suggest that peptic ulcer patients are more susceptible to aspirin-induced gastrointestinal bleeding.

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4984 ULTRASTRUCTURAL ASPECTS OF MESOTHELIAL CELLS AND CELLS FROM THE INTRAPERITONEAL EXUDATE DURING BILIARY PERITONITIS.

(It.) Margnelli, M. (Carlo Borella Hosp., Giussano Brianza, Italy). *Arch De Vecchi Anat Pat* 5(1/2): 175-190, 1967.

A sample of the peritoneal wall from a patient with diffuse, perforative biliary peritonitis showed complete loss of microvilli, large cytoplasmic vacuoles, and a reduced number of pinocytotic vacuoles. The large vacuoles might be due either to fusion of the pinocytotic vacuoles or to passive infiltration of liquid through the changed cell membrane. The region between the mesothelial tissue and the peritoneal cavity was made up of disintegrated cells, cell detritus, fibrin, and macrophages with intense phagocytic activity. Bile pigments were found in the lysosomes of subserous macrophages in the submesothelium and as irregular concentric spiral threads in intracellular vacuoles. This suggests that the discharge of bile rapidly produces lesions in the peritoneal mesothelium and that bile pigments infiltrate passively into tissues of the abdominal wall and are then eliminated normally. The macrophages, many of which adhered to the peritoneum, were large cells with pseudopodia which were less highly developed than those described in other physiological and pathological conditions. The nuclei of these macrophages almost always had several lobes, much like monocytes in the peripheral blood, but only a few had Golgi apparatuses. In all of them there were 3-15 large phagocytic vacuoles per cell which contained cell detritus in various stages of digestion and, in some, bacteria.

4985 THE ENIGMA OF UPPER GASTROINTESTINAL HEMORRHAGE.

(E.) Sandlow, L. J. (Michael Reese Hosp., Chicago, Ill.) *Amer J Gastgroent* 50(5):366-371, 1968.

A retrospective study was made of 400 patients over 12 yr of age who had active bleeding with melena or hematemesis and no obvious hematological problems to account for it. The diagnoses, established for 72% of the patients, were duodenal ulcer craters (32%), duodenal deformity (15%), gastric ulcers (14%), hemorrhagic gastritis (3%), and hiatus hernia (3.5%). No diagnosis could be made in 32% of the cases. About 1/3 of all patients, but 70% of those with hemorrhagic gastritis, had a history of previous bleeding. The mortality was only 5% among patients with previous bleeding and 10% among those who had no history of bleeding. No diagnosis was made in 60% of those who died while only 12% had duodenal ulcers and 18% had gastric ulcers. No ulcers were found in 41% of the patients with histories of duodenal ulcers.

4986 PERSONAL EXPERIENCE WITH ELECTRICAL STIMULATION OF THE INTESTINE IN THE TREATMENT OF POSTOPERATIVE PARALYTIC ILEUS.

(Fr.) Babin, S. (U. Hosp. Ctr., Strasbourg, France), M. Lampert, A. Kuhn, J. Pietri and R. Fontaine. *Gaz Hop* 140(28):791-797, 1968.

An intestinal pacemaker was successfully used to stimulate the duodenum in 15 of 22 adult patients with paralytic ileus caused by surgery on the digestive tract below the mesocolon (8 cases), gynecological or urological pelvic operations (6 cases), vascular surgery in which an abdominal or retroperitoneal approach was used (5 cases), operations on the digestive tract above the mesocolon (2 cases), or a medical condition (one case). Electrical stimulation of the intestine was combined with duodenal aspiration. Failures are attributed to true mechanical obstruction, too long a delay in using electrical stimulation, technical difficulties, and electrolyte disturbances or poor general condition of the patient.

4987 INTESTINAL FLORA IN WHOLE-BODY AND INTESTINAL X-IRRADIATED RATS. *(E.)*

Kent, T. H. (Radiat. Res. Lab., U. Iowa City), J. W. Osborne and C. M. Wende. *Radiat Res* 35(3):635-651, 1968.

The effects of bacteria on the small intestine following mucosal injury induced by X-irradiation were evaluated in Simonsen-strain male rats. Striking changes in small intestinal and cecal flora were noted after whole-body (1400 r) or intestinal (2000 r) irradiation; these changes were maximal 3 days after irradiation. Coliforms, enterococci, and *Proteus* increased 100-10,000 fold in the mid-small bowel and the cecum in most animals, while the usually predominant lactobacilli decreased slightly in numbers or remained unchanged. There was no massive bacterial invasion of the injured mucosa. Bacterial invasion of the mesenteric lymph nodes, spleen, liver, or heart blood was no different in control and irradiated animals. Oral administration of neomycin, polymyxin B or bacitracin prevented bacterial overgrowth. The findings indicate that massive changes in intestinal flora occur in rats with the intestinal-type irradiation syndrome, but that these changes are probably insignificant as a cause of animal mortality.

4988 DISTURBANCES OF CARBOHYDRATE METABOLISM IN INFANTILE MARASMUS.

(E.) Oxman V., S. (Dept. Pediat., Manuel Arriarán Hosp., U. Chile, Santiago), A. Maccioni S., A. Zúñiga C., R. Spada G. and F. Mönckeberg B. *Amer J Clin Nutr* 21(11):1285-1290, 1968.

Glucose assimilation rate and carbohydrate metabolism were studied in 13 infants (6-15 months old) with 3rd-degree marasmus due to protein and calorie deficiency and in 9 normal controls (6-12 months old). The marasmic group was found to have hypoglycemia and a decreased glucose tolerance when subjected to an intravenous glucose load. Analysis of the products of carbohydrate metabolism showed that while normal infants had increased blood levels of pyruvic and lactic acid after a glucose load, these levels fell in the marasmic group. The fasting glucose level was lower in marasmic infants, but the group showed a significantly higher fasting level of lactic and pyruvic acid when compared to the control group. It is suggested that the abnormalities observed could be explained by a failure in gluconeogenesis and a block in the pathway between glucose and pyruvic acid.

4989 **STRONGYLOIDIASIS AT THE BOSTON CITY HOSPITAL: EMPHASIS ON GASTROINTESTINAL PATHOPHYSIOLOGY AND SUCCESSFUL THERAPY WITH THIABENDAZOLE.** *(E.)* Amir-Ahmadi, H. (Boston City Hosp. Mass.), P. Braun, F. A. Neva, L. S. Gottlieb and N. Zamcheck. *Amer J Dig Dis* 13(11):959-973, 1968.

Detailed case reports are presented for 4 adults (2 men and 2 women, 26-63 yr old) and 1 child (6-yr-old girl) with strongyloidiasis. The oldest patient presented with a severe infection with 30,000 to 69,000 larvae per milliliter of stool and histamine-refractory achlorhydrra. Gastric biopsy showed adult female worms and rhabditiform larvae within the crypts and gastric glands. Malabsorption was evidenced by marked weight loss, hypoproteinemia, severe hypoalbuminemia, low serum cholesterol and reduced serum folate. Thiabendazole (1.0-2.5 g twice daily) was used for the treatment of this patient and in 4 others who had strongyloidiasis without evidence of malabsorption. All infections responded promptly to a two-day course of thiabendazole and the patients were all completely asymptomatic at discharge. Follow-up examination confirmed the effectiveness of this therapy and it is suggested that thiabendazole be considered the drug of choice in the treatment of strongyloidiasis in view of the short course of therapy required, the wide margin of safety, and minimal side effects.

4990 **RELATIONSHIP OF BEAN SUBSTRATES AND CERTAIN INTESTINAL BACTERIA TO GAS PRODUCTION IN THE DOG.** *(E.)* Richards, E. A. (Dept. Physiol. Biophys., U. Illinois, Urbana), F. R. Steggerda and A. Murata. *Gastroenterology* 55(4):502-509, 1968.

The results of *in vivo* and *in vitro* tests with bacterial cultures obtained from isolated intestinal segments of fasted female dogs indicate that certain anaerobic bacteria are closely related to gas production in the presence of navy bean and soybean products. The characteristically high carbon dioxide and hydrogen content of the gas produced in the *in vitro* experiments supports the assumption that the gas production is closely related to fermentation by the clostridia type of bacteria. Gas production in the presence of bean homogenates was completely inhibited by antibiotic and bacteriostatic agents. After injection of gas-producing bean products into intestinal loops, the numbers of anaerobic spore-forming organisms present on mucosal samples from the ileum and colon were markedly increased. It is suggested that similar techniques can be used effectively for detecting the presence of gas-producing factors in foods.

4991 **SURGICAL TREATMENT OF NON-ORGAN-RELATED RETROPERITONEAL TUMORS.** *(Rus.)* Cherkes, V. L. (Inst. Exp. Clin. Oncol., Acad. Med. Sci., USSR). *Vestn Khir Grekov* 100(5):55-60, 1968.

4992 **BILE PERITONITIS WITHOUT PERFORATION OF THE BILE DUCTS.** *(Rus.)* Machilaiev, M. M. (Mordveskaia Distr. Hosp., Tula oblast, USSR). *Vestn Khir Grekov* 100(5):108, 1968.

4993 **POSTOPERATIVE ILEUS.** *(Rev.)(E.)* Harrower, H. W. (VA Hosp., Providence, R. I.). *Amer J Surg* 116(3):369-374, 1968.

4994 **GASTROINTESTINAL HEMORRHAGE AS A POSTOPERATIVE PHENOMENON.** *(Rev.)(E.)* Williams, L. F. Jr. (Boston City Hosp., Mass.). *Amer J Surg* 116(3):375-381, 1968.

4995 **REVASCULARIZATION IN THE INTESTINAL ISCHEMIC SYNDROMES.** *(Sp.)* Rey-Baltar, E. (Santo Munic. Hosp., Basurto, Spain), A. Calderon and P. Martinez. *Cir Ginec Urol* 21(2):538-539, 1968.

4996 **ENTEROSTOMY IN THE TREATMENT OF INTESTINAL OBSTRUCTION.** *(Sp.)* Anfres, P. (Santa Cruz Hosp., Barcelona, Spain), P. Estelrich and M. Martinez-Brey. *Cir Ginec Urol* 21(2):489-497, 1968.

4997 **HEMORRHAGE OF THE UPPER DIGESTIVE TRACT.** *(Sp.)* Viver Manresa, E. (Soc. Security Svc. Clin., Barcelona, Spain) and J. Curto Cardus. *Cir Ginec Urol* 21(2):543-546, 1968.

4998 **ANCYLOSTOMIASIS.** *(Por.)* Siffert Junior, G. (Gen. Polyclin., Rio de Janeiro, Brazil) and A. S. Ambrosio. *Brasil Med* 82(1):53-56, 1968.

4999 **RADICAL SURGERY FOR EXTENSIVE MALIGNANT TUMORS OF THE ABDOMINAL CAVITY.** *(Ger.)* Rossetti, M. (Surg. Clin., U. Basel, Switzerland). *Chirurg* 39(3):105-109, 1968.

5000 **A REVIEW OF 113 CASES OF POSTOPERATIVE HERNIA.** *(Fr.)* Gillet, M. (Fac. Med., U. Strasbourg, France), J. Y. Gillet and M. Adloff. *Lyon Chir* 64(1):198-205, 1968.

5001 **CONGENITAL ANOMALIES OF THE DIGESTIVE TRACT.** *(Ger.)* Schmid, F. (Munic. Pediat. Clin., Aschaffenburg, Germany). *Fortschr Med* 86(7):304-306, 1968.

5002 **METABOLIC AND LYMPHOGRAPHIC STUDIES AND OPERATIVE FINDINGS IN A CASE OF CHYLOUS ASCITES.** *(Fr.)* Brassinne, A. (Inst. Med., U. Liege, Belgium), J. M. Collette, D. Honoré, G. Lejeune and L. Ruyters. *Arch Franc Mal Appar Dig* 57(4/5):497-504, 1968.

5003 **PRESSURE IN THE PORTAL VEIN AND INFERIOR VENA CAVA AND CHANGES IN THE LIVER DURING EXPERIMENTAL SIMPLE OCCLUSION OF**

THE INTESTINE IN THE DOG. *(Pol.)* Tolloczko, A. *Roczn Akad Med Marchlewski* (Suppl. 19):1-83, 1968.

5004 GIARDIASIS AND PANCREATIC INSUFFICIENCY. *(Fr.)* Van der Hoeden, R. (Ixelles Med.-Surg. Inst., Brussels, Belgium), R. Kiekens and C. Jeanty. *Acta Gastroent Belg* 31(2):155-167, 1968.

5005 SILVER DEPOSITS IN THE GASTRIC MUCOSA AND LIVER IN ARGYROSIS UNIVERSALIS FOLLOWING TREATMENT WITH TARGESIN. *(Ger.)* Bergmann, M. (Med. Polyclin., Friedrich-Schiller U., Jena, Germany) and C. Engel. *Deutsch Gesundh* 23(7):629-631, 1968.

5006 ENTEROPATHOGENIC *ESCHERICHIA COLI* IN ADULTS WITH CHRONIC INTESTINAL DISEASES. *(Rus.)* Savoshchenko, I. S. (Inst. Nutrit., Acad. Med. Sci. USSR), N. I. Iekisenina, T. I. Kudinova and L. M. Ivanova. *Zh Mikrobiol* 45(7):59-62, 1968.

5007 FREQUENCY OF *BACILLUS BIFIDUM* IN THE FECES OF ADULTS. *(Rus.)* Goncharova, G. I. (Moscow Inst. Epidemiol. Microbiol., USSR) and F. L. Vil'shanskaia. *Zh Mikrobiol* 45(7):55-59, 1968.

5008 THOUGHTS ON THE INTESTINAL DISEASES. *(Por.)* Fonseca Castro (Portuguese Pediat. Soc., Lisbon, Portugal). *Rev Port Pediat* 30(12):337-345, 1967.

5009 OCCLUSION DUE TO DUODENAL AND PANCREATIC MALFORMATIONS. *(Fr.)* Carlioz, H. (Paris, France), J. Gubler, J. Borde and P. Petit. *Ann Chir Infant* 9(2):111-123, 1968.

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5075 SYMPTOMS CAUSED BY PANCREATIC ISLET-CELL TUMORS. *(Ger.)* Classen, M. (Med. Clin. Polyclin., U. Erlangen, Germany). *Aktuel Gastroent* pp. 366-369. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

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5077 ENDOTOXIN-INDUCED HYPERLIPEMIA IN THE RABBIT. *(Ger.)* Huth, K. (Med. Clin. Polyclin., Justus-Liebig U., Giessen, Germany) and G. Karliczek. *Aktuel Gastroent* pp. 372-375. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5078 PEPTIDE-SECRETING ADENOMATA WITH SPECIAL REFERENCE TO THE ZOLLINGER-ELLISON SNYDROME. *(E.)* Sircus, W. (Western Gen. Hosp., Edinburgh, Scotland). *Postgrad Med J* 44(515):742-747, 1968.

5079 THE APPLICATION OF MOTILITY STUDIES TO GASTROENTEROLOGICAL PROBLEMS. *(E.)* Misiewicz, J. J. (Central Middlesex Hosp., London, England). *Postgrad Med J* 44(515):749-753, 1968.

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5080 FUNCTIONAL ESOPHAGEAL DISORDERS IN PATIENTS WITH SCLERODERMA. *(Ger.)* Heitmann, P. (José Joaquin Aguirre Hosp., Santiago, Chile) and J. Espinoza. *Deutsch Med Wschr* 93(41):1960-1966, 1968.

Intraluminal pressure measurements were performed by means of a two-channel polyethylene catheter in 17 patients (1 man and 16 women, 31-69 yr old) with histologically verified scleroderma and 30 healthy controls (15 men and 15 women, 19-72 yr old). The results revealed the complete absence of a gastroesophageal sphincter in 12 of the patients, and a poorly functioning sphincter in 3 others, together with manometric signs of esophageal reflux. A normally functioning gastroesophageal sphincter was found in all 30 controls. Fourteen of the patients also showed total or partial aperistalsis of the lower two-thirds of the thoracic esophagus, associated in 3 cases with a sliding hiatus hernia and in 2 cases with peptic stenosis.

5081 CARCINOMA OF THE DISTAL PART OF THE ESOPHAGUS AND CARDIA OF THE STOMACH. *(E.)* Humphrey, C. R. (Mem. Sloan-Kettering Cancer Ctr., New York City) and E. E. Cliffton. *Surg Gynec Obstet* 127(4):737-743, 1968.

An unselected, retrospective series of 592 patients with carcinoma of the distal third of the esophagus and gastric cardia is presented. The disease was localized in 42% of those with epidermoid carcinoma and 19.3% of those with adenocarcinomas. Nodal involvement was found in 35.8%, and 32.7% had direct extension into adjacent organs or distant metastasis. Early death is almost certain without treatment or following gastrostomy alone. All of the 65 patients with epidermoid carcinoma were dead of the disease within 10 months. Eleven of the 79 patients with adenocarcinoma who received no treatment survived 1 yr, and 2 lived for 2 yr. Radiation therapy alone produced 2 5-yr survivors. The operability rate was 65%. The operative mortality was 25.5%. The preferred treatment for the patient without extraluminal disease is resection, yielding a 1-yr survival rate of 50% for epidermoid carcinoma and 57% for adenocarcinoma, and a combined 5-yr survival rate of 14%. Radiation therapy offered only a 15-18% 1-yr survival rate. The treatment of choice in patients with known lymph node metastasis is not clear. Although radiation therapy does offer some degree of palliation, resection still offers the greatest chance of survival. Nine of the patients in the resected group survived for 3 yr and 3 survived for 5 yr. Only 36 or 12% of the 284 patients with adenocarcinoma received radiation therapy, while 152 or 49% of the 308 patients with epidermoid carcinoma received radiation therapy. One patient in each group survived 5 yr. Nine percent of patients with adenocarcinoma and 4% of patients with epidermoid carcinoma survived 2 yr; 3% and 1.2% were the corresponding figures for 3-yr survivors. The results of irradiation for adenocarcinoma appear to be as good as, or better than, that for epidermoid carcinoma. Resection should not be carried out in any patient with involvement of adjacent structures, since there were no long-term survivors. The preferred treatment is irradiation, perhaps supplemented with a bypass of the colon. The patients cured in the resected group often suffered from a high incidence of persistent, late postoperative complications, including emaciation, malnutrition, avitaminosis, dysphagia, or regurgitation. This fact has been overlooked in the discussions of palliation and cure in patients with this disease.

5082 ZENKER'S DIVERTICULUM: A REVIEW OF PATHOGENESIS AND PRESENTATION OF 25 CASES. *(E.)* Ponzoli, V. A. Jr. (U. Miami Sch. Med., Fla.). *Southern Med J* 61(8):817-821, 1968.

The 25 cases of Zenker's diverticulum (18 men and 7 women, 47-82 yr old, average 64) seen at the Jackson Memorial Hospital and Coral Gables V.A. Hospital during the period 1956-66 represented an incidence of 1:7,200-16,000 admissions; despite the significant number of Negro patients at these hospitals, all 25 cases were Caucasian. The most common presenting symptom was difficulty in swallowing (21 cases), followed by regurgitation (13 cases) and weight loss (9 cases); the duration of symptoms ranged from 6 months to 30 yr, but in most cases it was about 3 yr. All of the diverticula were shown by X-ray to be behind the upper esophagus, with an average size of 3 cm (0.5-6.5 cm). A concomitant hiatus hernia was found in 6 cases, and 5 patients had neurological diseases. Surgical treatment (high ligation of the neck of the sac and its amputation as a one-stage procedure) was given to 13 cases, with complete success in 10 and postoperative cord paralysis in 3 (permanent in 1); one patient required temporary esophageal dilatation for scarring. In 4 of the other 12 cases the diverticula were small and asymptomatic, and of the remaining 8, 2 patients were senile and 6 were poor surgical risks. The pharyngo-esophageal pulsion diverticula of Zenker are concluded to be due to an increased latenoy of response of the cricopharyngeal muscle. The pathogenesis of their association with hiatus hernia, however, is unknown.

5083 RADIATION-INDUCED EXPERIMENTAL CANCER OF THE ESOPHAGUS. *(E.)* Gates, O. (Harvard Cancer Commission, Boston, Mass.) and S. Warren. *Amer J Path* 53(5):667-685, 1968.

A ^{60}Co gamma radiation source about 2 x 0.5 mm in size (70-488 μC) was placed in the lung near the esophagus in 362 mice (202 males, 160 females) to evaluate radiation-induced carcinogenesis and the factors related to it. There were 140 RAP strain mice, and 26-48 mice per group were Ajax, C$_{57}$Bl, CF$_1$, C$_3$H, dba, LAF and BALB. The mice ranged in age from 4-10 weeks old. The incidence of epidermoid carcinoma of the esophagus in the 286 mice (150 male, 136 female) surviving at least 40 days was 15%. Multiple foci of advanced cancer of the esophagus were rarely seen, although multiple precancerous or early lesions were not unusual. No metastases were found. The marked reduction in life span of treated mice was due mainly to radiation-induced lesions other than cancer. Dose rates delivered to the portion of the esophageal mucosa nearest the source ranged from 100-4000 R/day, and those rates which were carcinogenic ranged from 220-4000 R/day. The cancer incidence rose to a peak of 46% with 751-1000 R/day and then decreased even though the majority of the 286 mice were exposed to lower dose rates. Life expectancy decreased with successively higher rates. There was more difference between strains than between sexes within the strains, but the doses and dose rates varied between the different sexes and strains. The overall incidence of cancer was 14% for males and 16% in females. A statistically significant difference in cancer incidence was found between Ajax (5%) and BALB (38%).

5084 **EXPERIMENTAL TOTAL REPLACEMENT OF THE ESOPHAGUS BY A FREE, AUTOLOGOUS, SMALL-INTESTINAL TRANSPLANT.** *(Ger.)* Meier, W. (Surg. Clin. A, U. Zurich, Switzerland). *Wiederbeleb Organersatz* 5(2):108-115, 1968.

The possibility of total replacement of the esophagus by a free transplant of the animal's own small intestine (an ileal segment) was investigated in 43 dogs of both sexes. The most successful procedure involved two vascular anastomoses, one in the neck (common carotid artery and external jugular vein) and one in the thoracic cavity (right intercostal artery and azygous vein); attempts to use the internal mammary artery and either the accompanying vein, the azygous vein or the hemiazygous vein were unsuccessful, as were attempts to perform vascular anastomoses with the Nakayama device or the Kodak-Eastman 910 adhesive technique. The distal end of the ileal segment was implanted directly in the stomach (end-to-side), while the proximal end was anastomosed to the cervical esophagus in a one-stage procedure (this being more successful than temporary creation of a cutaneoileostomy). The main problems encountered were in the area of vascular surgery, and the most common cause of failure was vascular thrombosis. Most of the dogs survived 1-15 days. In one dog which survived 6 months, the intestinal and vascular anastomoses were still found to be patent at autopsy, death having been due to marasmus resulting from ulceration of the transplant following its partial invagination at the site of passage through the upper thoracic aperture.

5085 **ESOPHAGEAL CONTRACTILITY AND DIAMETER IN ACHALASIA.** *(E.)* Norton, R. A. (Lahey Clin., Boston, Mass.) and M. Sultan. *Lahey Clin Found Bull* 17(3):117-119, 1968.

The relation between contractility and size of the esophagus was investigated in 9 patients with achalasia and 8 normal controls by measuring the transverse esophageal diameter and intraluminal pressures during swallowing. In the controls, nearly all the contractions were progressive and peristaltic, while in the achalasia patients most of the contractions were simultaneous and nonperistaltic. Esophageal contractility was inversely proportional to diameter, especially in achalasia. These results confirmed the existence of two types of achalasia: type 1 with esophageal diameters above 4.5 cm and pressures below 12 mm Hg, and type 2 with diameters of 2.7-4.5 cm and pressures of 12-30 mm Hg. A positive methacholine test and the presence of painful spasms serve to distinguish patients with type 2 achalasia from normal controls. Clinical symptoms, however, were essentially the same in both types of achalasia, with dysphagia being reported by all but one patient and pain by all but 2.

5086 **THE EFFECT OF CERVICAL VAGECTOMY ON ESOPHAGEAL FUNCTION IN THE MONKEY.** *(E.)* Binder H. J. (Yale U. Sch. Med., New Haven, Conn.), D. L. Bloom, H. Stern, G. B. Solitare, W. R. Thayer, H. M. Spiro and E. R. Poindexter. *Surgery* 64(6):1075-1083, 1968.

Cineradiographic, manometric and histological studies of the esophagus were performed before and after unilateral and bilateral cervical vagectomy in 7 rhesus monkeys. No significant changes in esophageal motility were seen after unilateral vagectomy and the methacholine test was negative in all 7 animals, although X-ray showed a delay in esophageal emptying in 3 cases. After the remaining vagus had been cut 7-14 days later, although 5 animals still showed some esophageal peristalsis, a syndrome closely resembling achalasia was seen in 2 cases and in the other 5 the radiological findings suggested a motility disorder resembling esophageal spasm. The methacholine test was positive in all cases after bilateral vagectomy, indicating postsynaptic degeneration. Histological studies revealed a decrease in size and number of ganglion cells in both animals with achalasia and 3 of the 5 with spasm. These results demonstrate the importance of the vagus nerve in the control of esophageal motility and suggest that a wide spectrum of esophageal motor dysfunction, including achalasia, may be associated with vagal abnormalities or denervation.

5087 **PRIMARY ADENOCARCINOMA OF THE ESOPHAGUS.** *(E.)* Turnbull, A. D. M. (Mem. Hosp. Cancer Allied Dis., New York City) and J. T. Goodner. *Cancer* 22(5):915-918, 1968.

Among 1859 patients with malignant tumors of the esophagus seen at the Memorial Sloan Kettering Cancer Center between 1926 and 1966, 1529 were found to have epidermoid carcinoma and 45 had primary adenocarcinoma (33 men and 12 women, 38-85 yr old). Of those with adenocarcinoma, 33 were selected for study on the basis of survival for at least 30 days following initiation of treatment. The sex, race, and age of patients with adenocarcinoma followed closely the pattern seen in patients with epidermoid carcinoma. The 5-year survival rate of 2.2% was based on a single patient with primary adenocarcinoma of the esophagus who lived 67 months following surgery. This was not significantly different from the 5-year survival rate of approximately 1.5% found in patients with epidermoid carcinoma. The prognosis of either form of carcinoma of the esophagus is uniformly poor, regardless of the site of orgin or treatment received.

5088 **EXPERIENCES WITH OESOPHAGEAL INTUBATION FOR OESOPHAGEAL CARCINOMA, WITH A REVIEW OF THE LITERATURE.** *(E.)* Procter, D. S. C. (Livingstone Hosp., Port Elizabeth, South Africa). *S Afr Med J* 42(37):967-974, 1968.

Complications resulting from esophageal intubation for advanced carcinoma are discussed on the basis of experience with 162 patients (113 men and 49 women, 30-83 yr old) who received Celestin tubes during a 5-yr period. These patients represented 35% of the 461 cases of esophageal cancer seen during 1963-67. Intubation failed in 11 cases, and 56 patients died without leaving the hospital. Although one patient survived 2.5 yr, the average survival was only 13 weeks, and not even palliation was achieved in many cases. Complications referrable to intubation accounted for death in 22 of the 27 cases subjected to postmortem examinations. These included wound sepsis and dehiscence (not usually fatal), occlusion of the tube, perforation of the tube, the esophageal wall, or the stomach, gastric hemorrhage, false mediastinal passage, mediastinal obstruction, and reguritation. Intubation should not be the procedure of choice in treating esophageal carcinoma and should be reserved only for terminal cases. The literature on the subject is discussed and the experiences of other authors are summarized in comparison with this series. Possible alternatives to intubation are briefly mentioned.

5089 THE PALLIATIVE TREATMENT OF ESOPHAGEAL CANCER BY MEANS OF PLASTIC PROSTHESES. *(Sp.)* De la Cruz Caro, F. (Fac. Med., U. Cadiz, Spain), F. Garrido Garcia and F. Higuero Moreno. *Cir Ginec Urol* 21(4):504-508, 1968.

5090 REFLUX ESOPHAGITIS: A REVIEW OF THE SOVIET AND FOREIGN LITERATURE. *(Rus.)* Grigor'iev, M. S. (Inst. Pediat. Med., Leningrad, USSR) and A. G. Kononov. *Vestn Khir Grekov* 100(5):119-126, 1968.

5091 DIAGNOSIS AND SURGICAL TREATMENT OF DIAPHRAGMATIC HERNIA. *(Rus.)* Kirle, P. (Vienna, Austria). *Khirurgiia (Moskva)* 44(2):83-87, 1968.

5092 THE SURGICAL TREATMENT OF PEPTIC STRICTURE OF THE ESOPHAGUS: A REVIEW OF THE LITERATURE. *(Rus.)* Chernousov, A. F. (Sci.-Res. Inst. Clin. Exp. Surg., Min. Health, Moscow, USSR). *Khirurgiia (Moskva)* 44(2):138-142, 1968.

5093 TWO CASES OF ESOPHAGEAL RUPTURE. *(Fr.)* Maruelle, R., J. Francois, P. Etienne and G. Tison. *Ouest Med* 21(9):733-738, 1968.

5094 RADIOLOGICAL DIAGNOSIS OF A SPONTANEOUS RUPTURE OF THE DISTAL ESOPHAGUS WITH PERICARDIAL FISTULA. *(Fr.)* Collard, M. (Munic. Hosp., Charleroi, Belgium) and P. Nöel. *Acta Gastroent Belg* 31(1):77-87, 1968.

5095 ON THE CAUSE OF TERTIARY CONTRACTIONS AND RELATED DISTURBANCES OF THE ESOPHAGUS. *(E.)* Stiennon, O. A. (St. Mary's Hosp., Madison, Wis.). *Amer J Roentgen* 104(3):617-624, 1968.

5096 A PROBLEM FOR EMERGENCY SURGERY: TRAUMATIC RUPTURE OF THE DIAPHRAGM. *(It.)* Adamoli, S. (Munic. Hosp., Genoa, Italy) and G. Cecchi. *Rass Arch Chir* 6(3):136-154, 1968.

5097 THE QUESTION OF A PHYSIOLOGICAL GASTROESOPHAGEAL REFLUX. *(Ger.)* Schoen, D. (Inst. Med. Radiol., U. Tubingen, Germany). *Arztl Forsch* 22(2):64-68, 1968.

5098 HIATUS HERNIA AND GASTRIC ACIDITY: THE ROLE OF DUODENAL ULCERS IN HYPERSECRETION. *(Fr.)* Nardi, G. L. (Massachusetts Gen. Hosp., Boston) and J. Cuche. *Arch Franc Mal Appar Dig* 57(6/7):569-574, 1968.

5099 THERAPEUTIC EFFECT OF A HYDROPHILIC SILICONE GEL IN ESOPHAGEAL DISORDERS. *(Sp.)* Llorens Salvans, V. (Med. Clin. A, Barcelona, Spain). *Med Clin* 51(2):269-271, 1968.

5100 A CONTEMPORARY ANALYSIS OF THE SURGICAL TREATMENT FOR DIGESTIVE TRACT HEMORRHAGE DUE TO ESOPHAGEAL VARICES. *(Sp.)* Escobar Pacheco, A. (San Borja Hosp., Chile) and M. Fernández Puente. *Hosp Vina del Mar* 23(1/2):25-27, 1967.

5101 RADIOLOGICAL EXAMINATION OF THE ESOPHAGUS. I. THE LOWER ESOPHAGEAL VESTIBULAR COMPLEX. *(Sp.)* Falomir, J. M. (Natl. Inst. Nutrit., Mexico City). *Gac Med Mex* 98(7):869-873, 1968.

5102 RADIOLOGICAL EXAMINATION OF THE ESOPHAGUS. II. NON-NEOPLASTIC LESIONS. *(Sp.)* Pitol, A. (Natl. Inst. Nutrit., Mexico City). *Gac Med Mex* 98(7):874-884, 1968.

5103 STUDY ON THE MORPHOLOGIC CHARACTERISTICS OF EARLY SQUAMOUS CELL CARCINOMA OF THE ESOPHAGUS. *(E.)* Collective report from the Dept. Path. Anat. of Honan Med. Coll., Peking Med. Coll., and the Inst. Oncol. Chinese Acad. Sci., Peking, China. *China's Med* (5):297-304, 1968.

5104 A STUDY OF 65 CASES OF ADENOCARCINOMA OF THE MIDDLE SEGMENT OF THE ESOPHAGUS. *(Turk.)* Cilingiroglu, H. K. (Med. Fac., U. Istanbul, Turkey) and N. Gürkan. *Turk Tip Cem Mec* 34(3):151-155, 1968.

5105 THE POSTEROLATERAL DIAPHRAGMATIC HERNIAS OF BOCHDALECK. *(Fr.)* Kourias, B. (Red Cross Hosp., Athens, Greece) and A. Agorogiannis. *Lyon Chir* 64(4):596-604, 1968.

5106 THE SURVIVAL RATE AMONG 214 PATIENTS WITH CANCER OF THE ESOPHAGUS TREATED BY MEANS OF TELECOBALT THERAPY. *(It.)* Rossetto, S. (Borgo Valsugana Ctr. Cancer Control, Trentino, Italy) and A. Caresano. *G Veneto Sci Med* 22(Suppl.):361-370, 1967.

5107 CANCER OF THE ESOPHAGUS: RECENT PROGRESS. *(Rev.)(E.)* Wilkins, E. W. Jr. (Harvard Med. Sch., Boston, Mass.) and D. B. Skinner. *CA* 18(4):227-231, 1968.

5108 IMMEDIATE ESOPHAGECTOMY FOR INSTRUMENTAL PERFORATION OF THE THORACIC ESOPHAGUS. *(E.)* Hendren, W. H. (Mass. Gen. Hosp., Boston) and B. M. Henderson. *Ann Surg* 168(6):997-1003, 1968.

5109 THE MALLORY-WEISS SYNDROME. *(Ger.)* Gröbner, W. (Munic. Hosp., Karlsruhe, Germany). *Z Gastroent* 6(4):251-256, 1968.

5110 SPONTANEOUS RUPTURE OF THE ESOPHAGUS. *(Nor.)* Jorgensen, O. G. (Ulleval Hosp., Norway). *T Norsk Laegeforen* 88(18):1682-1683, 1968.

5111 HIATUS HERNIA AND CORONARY DISEASE. *(Pol.)* Borowicz, J. (Inst. Med. Radiol., Acad. Med., Warsaw, Poland) and J. Kuch. *Pol Tyg Lek* 23(48):1850-1852, 1968.

5112 CHEMICAL TRAUMA OF THE ESOPHAGUS AND STOMACH. *(E.)* Citron, B. P. (U. Southern California Med. Ctr., Los Angeles), I. J. Pincus, M. C. Geokas and B. J. Haverback. *Surg Clin N Amer* 48(6): 1303-1311, 1968.

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5115 PHYSIOLOGICAL REPAIR FOR SLIDING HIATUS HERNIA. *(E.)* Maciver, D. A. (Natl. Def. Med. Ctr., Ottawa, Canada), G. W. Chapman. *Canad J Surg* 11(4):405-411, 1968.

5116 DIAPHRAGMATIC HERNIA IN INFANCY: FACTORS AFFECTING THE MORTALITY RATE. *(E.)* Johnson, D. G. (Child. Hosp., Philadelphia, Pa.), R. M. Deaner and C. E. Koop. *Surgery* 62(6):1082-1091, 1967.

5117 OUR EXPERIENCE IN THE SURGICAL TREATMENT OF MALIGNANT AND BENIGN ESOPHAGEAL TUMORS. *(E.)* Petrovsky, B. V. (Acad. Med. Sci. USSR, Moscow) and E. N. Vantisan. *Surgery* 62(5):833-838, 1967.

5118 FORAMEN OF MORGAGNI HERNIAS IN CHILDREN. *(E.)* Baran, E. M. (Mayo Graduate Sch. Med., Rochester, Minn.), H. E. Houston, H. B. Lynn and E. J. O'Connell. *Surgery* 62(6):1076-1081, 1967.

5119 ESOPHAGITIS, HIATUS HERNIA AND CANCER. *(E.)* Boyd, D. P. (Lahey Clin. Found. Boston, Mass.) and R. A. Norton. *Geriatrics* 23(11):118-121, 1968.

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5121 CLINICAL MANIFESTATIONS OF ESOPHAGITIS. *(E.)* Farrar, J. T. (Med. Coll. Virginia, Richmond). *Postgrad Med* 44(5):132-135, 1968.

5122 MEDICAL TREATMENT OF ESOPHAGITIS OF HIATAL HERNIA. *(E.)* Hargrove, M. D. Jr. (Louisiana State U. Med. Ctr., Shreveport). *Postgrad Med* 44(5):141-145, 1968.

5123 CORRELATIONS BETWEEN HEARTBURN AND THE RESULTS OF THE ACID PERFUSION TEST AND BIOPSY OF THE DISTAL ESOPHAGUS. *(Ger.)* Ottenjann, R. (Med. Clin., U. Erlangen-Nuremberg, Germany), G. Lux, O. Stadelmann and K. Elster. *Aktuel Gastroent* pp. 303-305. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5124 THE MOTILITY OF THE ESOPHAGUS IN GASTRIC DISEASES. *(Ger.)* König, K. (1st Med. Clin., U. Hamburg, Germany). *Aktuel Gastroent* pp. 306-307. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5125 EVENTRATION OF THE DIAPHRAGM. *(E.)* McNamara, J. J. (Baylor U. Med. Ctr., Houston, Texas), D. L. Paulson, H. C. Urschel Jr. and M. A. Razzuk. *Surgery* 64(6):1013-1022, 1968.

5126 ESOPHAGEAL DIVERTICULA: RELATED NEUROMUSCULAR PROBLEMS. *(E.)* Cross, F. S. (St. Luke's Hosp., Cleveland, Ohio). *Ann Otol* 77(5): 914-926, 1968.

STOMACH

(Gastric ulcer is placed with peptic ulcer)

5127 MALABSORPTION OF HEMOGLOBIN IRON IN PERNICIOUS ANEMIA: CORRECTION WITH INTRINSIC FACTOR-CONTAINING SUBSTANCES.

(E.) Waxman, S. (Mt. Sinai Sch. Med., City U. New York, N. Y.), P. Pratt and V. Herbert. *J Clin Invest* 47:1819-1824, 1968.

Absorption studies with ^{59}Fe-labeled sheep hemoglobin (administered p.o. in tomato juice at a dose of 4 mg Fe) showed that intestinal absorption of hemoglobin iron was only about half as complete (2.7-21.4%, mean 10.4% in 2 weeks) in 5 patients with treated pernicious anemia and concomitant iron deficiency as in 2 patients with uncomplicated iron-deficiency anemia (18.1-21.0%), while the value in 2 normal controls was comparable (8.5-11.9%). Only the pernicious anemia patients responded, however, with increased iron absorption when the labeled hemoglobin was mixed with either crude hog intrinsic factor (50 mg; absorption increased to 15.6-41.7%, mean 26.9%), purified intrinsic factor (1 mg; absorption increased to 3.6-38.5%, mean 19.4%), or normal, neutralized, depepsinized, human gastric juice (20 ml; absorption increased to 19.8-36.5%, mean 23.3%). Iron absorption was not significantly increased by gastric juice from pernicious anemia patients, nor by hog intrinsic factor which had been preincubated with intrinsic factor antisera (sera from pernicious anemia patients). None of these substances increased organic iron absorption in normal or iron-deficient control subjects. *In vitro* studies (separation on dextran-coated charcoal, sucrose density gradient ultracentrifugation, sephadex gel filtration) are also reported which indicate that heme complexes with a substance present in intrinsic-factor-containing materials. It is still unclear whether a gastric glycoprotein similar to intrinsic factor serves as an intestinal transport factor for heme, or whether normal gastric juice acts by another mechanism.

5128 SMOOTH MUSCLE TUMOURS OF THE STOMACH: A CLINICAL STUDY OF 112 CASES.

(E.) Salmela, H. (Surg. Clin., U. Helsinki, Finland). *Acta Chir Scand* 134(5):384-391, 1968.

The 112 cases of gastric smooth-muscle tumors which were operated on and studied histologically in Finland in 1953-1960 are analyzed. Histopathologically, the tumors were classified as ordinary leiomyoma in 59 cases, cellular leiomyoma in 25, leiomyoma with regimentation in 8, and leiomyosarcoma in 20. Leiomyosarcoma of the stomach showed an average incidence of 2-3 cases per annum in Finland during the period. The age of the patients ranged from 29-79 yr. The symptoms in the various tumor groups included abdominal pain, melena, hematemesis, weight loss, palpable swelling and tenderness on palpation. The tumor was not revealed by roentgenologic examination in 22 of the leiomyoma patients or 3 of the leiomyosarcoma patients, although they ranged from 0.5-25 cm in diameter. Larger tumors were more numerous among leiomyosarcomas and cellular leiomyomas. More than half of the leiomyosarcomas were soft or loose in consistency. The leiomyomas did not metastasize, while 8 cases of metastasis were noted in the leiomyosarcoma patients. The predominant therapeutic measures were surgery and postoperative X-ray. The relative survival curves showed that leiomyoma patients had the highest survival rate.

5129 GASTRIC HISTOLOGY AND AUTOANTIBODIES IN PERNICIOUS ANEMIA.

(E.) Rodbro, P. (Glostrup Hosp., Copenhagen, Denmark), V. Faber, H. Dige-Petersen and J. Howitz. *Acta Med Scand* 183(3):217-223, 1968.

Gastric histology and autoantibodies were investigated in relation to age and duration of the disease in 28 patients (10 males, 18 females) with Addisonian pernicious anemia in remission. The patients ranged in age from 31-81 yr, and the mean duration of the disease was 4 yr. The average age of the patients increased slightly with the severity of the gastric lesion, and intrinsic factor antibody was not found in 5 patients with gastric atrophy. The prevalence of parietal cell antibodies was the same in all groups. All patients below 60 yr of age had parietal cell antibodies in the serum; in the 14 patients below the age of 60, only 1 showed gastric atrophy, while gastric atrophy was observed in 4 patients in the older group. Divided into groups with a duration of pernicious anemia of less than and more than 4 yr, resp., the patients showed no difference in gastric histolog or prevalence of intrinsic factor antibody and parietal cell antibody. Parietal cell antibody, alone or with intrinsic factor antibody, are common findings in patients with pernicious anemia and only 2 patients had neither intrinsic factor antibody nor parietal cell antibody in the serum. Although intrinsic factor antibody may play a crucial role in the development of overt pernicious anemia, there is no direct evidence to show that gastric autoantibodies play any role in the pathogenesis of gastric lesions.

5130 PRIMARY CARCINOMA OF THE GASTRIC STUMP AND THE GASTROJEJUNAL ANASTOMOSIS FOLLOWING GASTRIC RESECTION FOR PEPTIC ULCER.

(It.) Boselli, P. L. (Inst. Gen. Clin. Surg., U. Pavia, Italy) and A. De Medici. *Minerva Chir* 23(12):605-614, 1968.

During the period 1958-67, 5 cases of carcinoma of the gastric stump or anastomosis following partial gastrectomy for peptic ulcer (2 duodenal and 3 gastric) were seen at the University of Pavia. However, none of these 5 men (45-69 yr old, with symptoms of 1-8 months duration and a history of partial gastrectomy 10-24 yr before) had originally been treated at this institution, and no cases of stomach cancer have been encountered among the 910 peptic ulcer patients subjected to gastrectomy by the authors during the 10-yr period. The incidence of cancer of the gastric stump is therefore impossible to estimate from these data. Although occult blood was present in the feces in all 5 cases, only one had overt bleeding. The cancer was located in the anastomosis in 2 cases, in the gastric stump near the anastomosis in 2 others, and in the subcardial stump in the fifth. Radical surgery was possible only in 2 cases, and the importance of early diagnosis of these tumors is emphasized. It is doubted that there is any direct etiological connection between gastrectomy and the development of cancer, the coincidence being ascribed mainly to chance.

5131 THE EPIDEMIOLOGY OF GASTRIC CANCER.

(Sp.) Borges, C., C. (Natl. Inst. Nutrit., Mexico City) and J. J. Villalobos Pérez. *Rev Invest Clin* 20(1):11-23, 1968.

In a retrospective study, the sex, age, medical history, and personal habits of 393 patients (62% male, 20-89 yr old) with cancer of the stomach (349 cases diagnosed histologically) were compared with those of 500 healthy controls (43% male, same age range but a somewhat older average). These 393 cases represented 35.5% of all digestive tract cancers seen during a 20-yr period, the other common sites being the colon, biliary tract and pancreas. About half of each group were nonsmokers, and neither smoking nor the use of gastric irritants such as chile peppers is concluded to be related to the pathogenesis of stomach cancer. About 18% of the stomach cancer group were alcoholics, however, compared to 3% in controls, and 30% had a deficient diet.(an absence of protein and less than 1400 calories/day) compared to 8% in controls. While only 4 patients had had other cancers previously, 9% had a family history of carcinoma (6.5% in controls) and 3% had a family history of stomach cancer (0.75% in controls). Only 10.8% of the stomach cancer group had a history of peptic ulcers, which are concluded to be unrelated to stomach cancer, but 56% showed gastric achlorhydria and 25% more had hypochlorhydria. There was a slight excess of blood type A among both stomach cancer patients and peptic ulcer patients. It is concluded that alcoholism, male sex, dietary deficiencies and genetic factors probably play a role in the etiology of stomach cancer.

5132 CARCINOMA OF THE STOMACH: A COMPARATIVE STUDY OF SERIES FROM THREE HOSPITALS SERVING AREAS OF DIFFERENT TYPES. *(E.)* Bergljung, L. (Dept. Surg., U. Umeå, Sweden) and S. Borgström. *Acta Chir Scand* 134:379-383, 1968.

To determine whether the place of residence in Sweden has any effect on the time at which a carcinoma of the stomach comes to surgery or on the results of treatment, all patients treated at departments of surgery in a large city (Malmö-294 patients), a medium-sized town with a densely populated rural area of small size (Lund-249 patients) and a medium-sized town with a large but sparsely populated rural area (Umeå-196 patients) were analyzed regarding the length of the history, age and sex distribution, type of surgical procedure, frequency of factors prejudicial to prognosis, and the length of survival. In the 3 series, no significant differences in the length of the history was noted. Age and sex distribution agreed closely (mean age 68-70 yr, ratio of men to women 1.7/1 to 1.9/1). The frequency of radical operation decreased rapidly with increasing extent of the carcinoma: 45% in Malmö, 51% in Lund, and 41% in Umeå. The incidence of cancer growth in the resection margin was 15% in Malmö, 17% in Lund, and 11% in Umeå, and was always associated with serosal perforation and/or lymph node metastases. Serosal perforation was more common than lymph node metastases in Umeå, and equally frequent in Malmö and Lund. Twenty-three percent of patients in Malmö, 17% in Lund, and 11% in Umeå coming to radical surgery were entirely free of factors unfavorable to prognosis. The 5-yr survival for the whole series was 15% in Malmö, 9% in Lund, and 10% in Umeå. Corresponding figures for patients treated by radical surgery were 33% in Malmö, 18% in Lund, and 28% in Umeå. Only 10% of patients treated palliatively survived for 6 months. A carcinoma of the stomach thus comes to surgical therapy later in sparsely populated rural districts, but this is not reflected in the length of survival.

5133 MUCOSAL MEASUREMENTS AND GASTRIC SECRETION IN GASTRITIS. *(E.)* Burhol, P. G. (Ullevål Hosp., Oslow, Norway), J. Myren and S. Reichborn-Kjennerud. *Scand J Gastroent* 3(4):339-345, 1968.

In 22 women and 37 men with dyspepsia, suction biopsies were obtained with a Crosby-Kugler capsule from the fundus or body of the stomach. In none of the patients were peptic ulcers or gastric tumors found by gastroscopy and X-ray examination of the stomach and duodenal cap. Mucosal measurements were performed in the stained histological sections. The volume of gastric secretion and the concentration and output of total HCl were determined before and after subcutaneous injection of 0.05 mg/kg histamine-phosphate. One-third of the patients had normal gastric mucosa, one-third superficial gastritis, and one-third atrophic gastritis, the average ages in these groups being 50, 55, and 61 yr, resp. In the patients with superficial gastritis a significantly increased thickness of the foveolar layer was found, whereas the glandular layer thickness and the secretion of gastric juice and HCl were not significantly altered. In the patients with atrophic gastritis a further significant increase in the thickness of the foveolar layer was noted. These patients also showed a significantly reduced thickness of the glandular layer and a significantly decreased secretion of gastric juice and HCl.

5134 INCIDENCE OF YEAST-LIKE FUNGI IN GASTRIC JUICE UNDER NORMAL AND PATHOLOGICAL CONDITIONS. *(E.)* Schönebeck, J. (Central Hosp., Norrköping, Sweden). *Scand J Gastroent* 3(4):351-354, 1968.

The incidence of yeast-like fungi in the gastric juice was studied in catheter and direct samples from patients with and without gastric diseases. Yeasts were present in 57% of persons without gastric disorders and in 55% of patients with duodenal ulcer. A statistically significant higher frequency was noted in patients with gastric ulcer or carcinoma and in those who had undergone partial gastric resection (79%, 82%, and 75%, resp.). In contrast to retention due to stenosis, retention deriving from impaired passage through the small intestine was accompanied by a higher frequency of yeasts. A high gastric acid production was associated with a significantly lower frequency of yeasts. Microscopic examination of the gastric juice gave positive results fairly often, even when there were no roentgen signs of intraluminal mycosis. Consequently, the demonstration of yeast growth on culture and positive microscopic findings do not suffice for a diagnosis of intraluminal mycosis, but should be combined with roentgen findings and preferably supplemented by gastrophotography.

5135 THE PROBLEM OF GASTRIC PHLEGMON. *(Rus.)* Minkov, S. I. (Skopinsk Munic. Hosp., USSR) and A. S. Tuchin. *Khirurgiia (Moskva)* 44(2):93-97, 1968.

Among 9 cases of gastric phlegmon (5 primary and 4 secondary) encountered between 1959 and 1966, 8 were focal in nature and 1 was diffuse. Brief case histories are presented for 3 of these patients, with comments as to the diagnosis, prognosis and treatment of this relatively rare condition. The procedure of choice is felt to be partial gastrectomy (performed in 3 of 9 cases), although some cases can be treated successfully by intramural administration of antibiotics, instillation of antibiotics into the greater and lesser omentum followed by drainage of the abdominal cavity, or surgical opening of a focal abscess followed by drainage. The results of purely conservative treatment are poor, with frequent development of peritonitis. The mortality among 54 cases analyzed was 33%, including 6 of 9 treated conservatively, 6 of 18 treated with intramural antibiotics, 2 of 9 treated by opening of a focal abscess, and only 2 of 16 treated by partial gastrectomy. Careful follow-up of these patients is urged in view of the possible development of stomach cancer; 2 of 8 who were followed died of stomach cancer 1-8 yr postoperatively.

5136 HOMOTRANSPLANTATION OF THE STOMACH.

(Sp.) Garrido, F. (Fac. Med., U. Cadiz, Spain), A. Moran, M. Pardo and F. de la Cruz Caro. *Cir Ginec Urol* 21(4):513-519, 1968.

Heterotopic homotransplantation of the stomach into the inguinocrural region was performed in a series of dogs ranging in weight from 5-10 kg for the donor animals to 15-20 kg for the recipients. In each case, ligation of the hepatic and pyloric veins was followed by anastomosis of the celiac trunk and portal vein to the superficial femoral artery and vein of the recipient; all animals received postoperative oxytetracycline (250 mg t.i.d.), with or without immunosuppressants. The transplant produced marked leukocytosis with neutrophilia and lymphopenia in the recipients, particularly in those not given immunosuppressant therapy. All transplants surviving beyond 4 days showed signs of peripheral vascularization. The maximum period of viability was 11 days without immunosuppressant therapy, 23 days with Imuran (2.5 mg/kg/day) and 40 days with methotrexate (0.1 mg/kg/day); most of the treated animals also received prednisolone (25 mg/day). Histamine (0.04 mg/kg) produced gastric secretion from the transplant with a maximal acidity in 45 minutes, but there was no evidence for pepsin secretion. Histological examination of the mucosa of the transplants revealed the following changes which eventually led to rejection (but which were markedly reduced or delayed by immunosuppressant therapy): edema of the gastric wall, erosion of the mucosa, cellular infiltration of the muscularis mucosae, neuronal vacuolization of the elements of Auerbach's plexus, and hemorrhagic foci with granulation tissue formation in the serosa.

5137 COMPLICATIONS FOLLOWING GASTRECTOMY.

(Rus.) Saienko, A. I. (Kirghiz Sci.-Res. Inst. Oncol. Radiol., Frunze, USSR). *Vestn Khir Grekov* 100(5): 112-115, 1968.

Among 312 patients subjected to gastrectomy for unspecified reasons (plus esophagojejunostomy in 219 cases, esophagoduodenostomy in 41 and replacement of the stomach by a loop of large intestine in 52), the most common postoperative complication (next to pneumonia) was rupture of the anastomosis (26 cases), followed by inflammation of the anastomosis (16 cases) and small intestinal obstruction (10 cases). A total of 48 patients died, including 23 due to rupture of the anastomosis, 6 due to intestinal obstruction, and 11 of pneumonia. There were only 2 cases of intestinal hemorrhage, 2 of mesentery vascular thrombosis, and 1 of peritonitis. The rate of serious complications was highest following gastrectomy and esophagoduodenostomy (with rupture of the anastomosis in 8 of the 41 cases), although this procedure is also the quickest and simplest, as a result of which cardiovascular and respiratory complications are less common. All of the 5 cases of anastomotic rupture following replacement of the stomach by a loop of large intestine involved the anastomosis between the esophagus and the intestinal loop. Only 13 cases of anastomotic rupture occurred among the 219 patients given esophagojejunostomy, and no such complications occurred in any of the last 103 patients (operated on by various procedures), thanks to improvements in surgical technique. The mortality was also lower following esophagojejunostomy (31 deaths among 219 cases) than following the other 2 procedures (17 deaths among 93 cases).

5138 LOCALIZED HYPERPLASIA OF THE ANTRAL REGION OF THE STOMACH IN ADULTS.

(Fr.) Dochez, C. (Stuivenberg Hosp., Antwerp, Belgium) and R. Van Grootenbril. *J Belge Radiol* 51(5):247-252, 1968.

The clinical radiological features of localized antral hyperplasia are described on the basis of 4 cases (3 men and 1 woman, 48-61 yr old) diagnosed at surgery or autopsy after a history of weight loss and variable abdominal pain. In view of the similarity between the radiological picture in this condition and that in diseases such as gastric cancer or ulcer, a definitive diagnosis is possible only on the basis of the clinical history and repeated studies. Among the factors which may play a role in the pathogenesis of this condition are congenital anomalies of the gastric wall, neuroautonomic dystrophy, and inflammatory conditions. The only effective treatment is surgical.

5139 SUSCEPTIBILITY TO STOMACH CANCER.

(E.) Hems, G. (Dept. Soc. Med., U. Aberdeen, Scotland). *Brit J Cancer* 22(3):461-465, 1968.

The age distribution of stomach cancer mortality in 7 countries (Finland, Germany, Scotland, Netherlands, England and Wales, Canada and the United States) was examined to determine whether the difference in the rates for males and females is related to inherent susceptibility or differential exposure to carcinogenic factors. There appeared to be no increase in the slope of the mortality curve for males in early adult life, which might be expected if starting work were generally accompanied by increased exposure to carcinogenic factors. The lower incidence of stomach cancer in females was found to arise in 2 ways: from 20-50 yr of age the slope of the age-mortality curve was lower for females than for males, and at ages above 50 yr, the female mortality curve had approximately the same slope as the male curve but was displaced below it. The increase in the slope could be a result of increased exposure of females to carcinogens in mid-adult life, or of an increase in susceptibility. A change in susceptibility is more reasonably associated with the change in slope. The age at which the apparent change in susceptibility occurs suggests that it might be associated with the menopause. Establishment of the validity of this interpretation depends upon additional studies.

5140 THE EFFECT OF LONG-TERM TREATMENT WITH PREDNISONE UPON THE STATE OF THE HUMAN GASTRIC MUCOSA.

(E.) Siurala, M. (Gastroent. Dept., U. Helsinki, Finland), P. Peltola and K. Varis. *Scand J Gastroent* 3(4):407-412, 1968.

Gastric biopsies were obtained from 28 patients (6 men and 22 women, mean age 42 yr, including 20 with gastritis and 8 with a normal gastric mucosa) before and 2 and 14 weeks after the beginning of prednisone treatment (daily dose 20-40 mg) for rheumatoid arthritis or other diseases. The basal and maximal acid output were evaluated in 11 patients. Of 13 patients with atrophic gastritis, 6 showed regeneration of the normal body glands, 4 showed some lessening of inflammation and 1 showed increased inflammation. In the remaining patients, the state of the mucosa did not respond to treatment. Eight patients with a normal gastric mucosa and 7 with superficial gastritis showed no definite histological changes during the period of prednisone treatment. The basal and maximal acid output revealed some tendency towards an increase in 3-4 patients, and did not decrease in any.

5141 DEHYDROGENASE ACTIVITY AND GASTRIC SECRETION IN GASTRITIS. *(E.)* Burhol, P. G. (Ullevål Hosp., Oslo, Norway) and J. Myren. *Scand J Gastroent* 3(4):387-394, 1968.

Suction biopsies from the fundus or the body of the stomach were obtained with a Crosby-Kugler capsule in 43 adults (33 men and 10 women, 29-77 yr old, including 16 with gastric ulcers, 2 with duodenal ulcers, and 1 with stomach cancer). One-half of each specimen was prepared for microscopic examination, and cryostat sections from the other half were incubated with Nitro-BT and the specific substrates to demonstrate the activity of succinic- (SD), nicotinamide-adenine-dinucleotide-(NADD), and nicotinamide-adenine-dinucleotide-phosphate-dehydrogenase (NADPD), resp. An augmented histamine-test was performed in all patients after an overnight fast. In 10 patients with a normal gastric mucosa the activity of SD, NADD and NADPD was most pronounced in the parietal cells. In 18 patients with superficial gastritis a similar or slightly decreased dehydrogenase activity was observed, and the secretion of gastric juice and HCl did not differ significantly from that found in the subjects with normal gastric mucosa. Except for a markedly reduced NADD activity in the surface epithelium, slight or no reduction of the dehydrogenase activity was observed in 8 patients with atrophic gastritis; the secretion of gastric juice and HCl was significantly lower than in subjects with normal gastric mucosa and in those with superficial gastritis. In the surface and foveolar epithelium of the 7 patients with intestinal metaplasia, a markedly or slightly increased activity of all dehydrogenases examined was noted. The chief cells demonstrated an unaltered dehydrogenase activity, whereas the parietal cells showed a markedly or slightly decreased dehydrogenase activity. The secretion of gastric juice and HCl was significantly lower than in normal patients or those with superficial gastritis, but was comparable to that in atrophic gastritis.

5142 INTESTINAL METAPLASIA OF THE GASTRIC MUCOSA: A GROSS AND MICROSCOPIC STUDY OF ITS DISTRIBUTION IN VARIOUS DISEASE STATES. *(E.)* Stemmermann, G. N. (Kuakini Hosp., Honolulu, Hawaii) and T. Hayashi. *J Nat Cancer Inst* 41(3):627-634, 1968.

Microscopic sections of gastric mucosa were evaluated in 13 patients with duodenal ulcer, 17 patients with gastric carcinoma, and 45 patients with gastric ulcer. These specimens were stained to demonstrate alkaline phosphatase activity, which occurs only in areas of intestinal metaplasia. The alteration was most frequent and most intense on the lesser curvature at the junction of the pylorus and the corpus, and was frequently associated with a band of metaplasia on both the anterior and posterior walls of the junction. Although metaplasia was more frequently associated with cancer than gastric ulcer, it had the same distribution when associated with either of these conditions. The most frequent site of gastric ulcer was more closely correlated with the sites of maximal metaplasia than was carcinoma. Even when cancer and metaplasia coexisted, the sites of these changes did not always coincide. Microscopic analysis of the intestinal metaplasia indicated that it may begin in the neck region of the glands unaffected by gross injury or microscopic evidence of inflammation.

5143 β-GLUCURONIDASE ACTIVITY OF GASTRIC JUICE IN GASTRIC CARCINOMA. *(E.)* Russell, R. I. (Western Infirm., Glasgow, Scotland) and C. Watts. *Gut* 9(5):585-589, 1968.

A simplified and reproducible technique was developed for the collection of gastric juice, after which the normal levels of β-glucuronidase activity in gastric juice were established and compared with those found in 26 cases of gastric carcinoma. It was found that 93.3% of patients, with gastric carcinoma had high enzyme levels. A prospective study indicated an accuracy of biochemical diagnosis comparable with that of radiology and endoscopy, although a small number of false positive (10.8%) and false negative (6.7%) results were obtained. The test is easily performed using standard biochemical methods and is acceptable to the great majority of patients.

5144 LIPOFUSCINOSIS OF THE LIVER IN CHRONIC GASTRIC DISEASES AND FOLLOWING GASTRIC SURGERY. *(Ger.)* Kranz, D. (Inst. Path., Humboldt U., Berlin, Germany). *Acta Hepatosplen* 15(5):345-350, 1968.

Histological studies on 103 liver biopsies from 72 patients (55 men and 17 women, 25-78 yr old, average 53 yr) who had undergone partial or total gastrectomy up to 37 yr before and 31 patients (25 men and 6 women, 27-76 yr old, average 46 yr) with a 2-26 yr history of chronic gastritis or peptic ulcer revealed significant deposits of lipofuscin (grade 2 or 3 lipofuscinosis) in 88 cases, including 64 gastrectomized patients and 24 with chronic gastritis or ulcers. The lipofuscin content was inversely proportional to the fat content of the liver cells or the severity of concurrent inflammatory disease. It was independent of age and the time elapsed since gastrectomy, but increased with the duration of chronic gastroduodenal disease. Particularly large lipofuscin deposits were found in 6 patients with gastrectomy-induced malabsorption, due possibly to a deficiency of vitamins C and E.

5145 MYELOPATHY FOLLOWING PARTIAL GASTRECTOMY. *(E.)* Olivarius, B. de F. (Dept. Neurol., U. Copenhagen, Denmark) and D. Roos. *Acta Neurol Scand* 44(3):347-362, 1968.

Case reports are presented for 5 patients (4 men and 1 woman, 51-68 yr old, mean 59.4 yr) who developed neurological signs of myelopathy 4-15 yr (average 9.8 yr) after partial gastrectomy and 0-7 yr after other postgastrectomy syndromes. These patients were seen in a 3-yr period in a single neurology department and bring the total number of reported cases to 26. None of these 5 patients showed hematological signs of megaloblastic anemia, although 3 had steatorrhea, 1 had gastrectomy-induced osteopathy, and electromyography showed signs of peripheral nerve involvement in 2 of 3 patients examined. Clinical signs of peripheral nerve involvement were found in all patients, as was evidence of involvement of the posterior columns of the spinal cord, and 4 patients also showed unequivocal signs of pyramidal tract involvement. Histamine-resistant achlorhydria was found in all 4 patients studied. The serum vitamin B_{12} was 60-221 pg/ml, indicating that myelopathy may exist in the absence of the usual vitamin B_{12} deficiency. The value of the Schilling test in making a proper diagnosis is stressed. Administration of vitamin B_{12} (oral in 1, parenteral in 4) produced subjective improvement, although the neurological abnormalities remained unchanged. These 5 cases suggest that myelopathy following partial gastrectomy is more frequent than generally recognized. Such cases should be followed for at least 9 yr after surgery, and a neurologist should probably be included in the team of physicians in charge of partially gastrectomized patients in order to diagnose complications as early as possible. The practice of giving suboptimal doses of vitamin B_{12} to patients developing neurological symptoms following partial gastrectomy should be discouraged.

5146 VASOPRESSIN IN THE TREATMENT OF HEMORRHAGIC GASTRITIS. *(E.)* Crystal, R. F. (Med. Coll. Virginia, Richmond). *Amer Surg* 34(12): 895-899, 1968.

The effect of vasopressin on the gastric mucosa and its possible use in the control of hemorrhagic gastritis were studied in the innervated fundi of 10 anesthetized female Sprague-Dawley rats in which this condition was simulated by abrasion of the gastric mucosa. Injection of vasopressin (0.125 U i.v.) resulted in blanching of the gastric mucosa, cessation of gastric secretion and contraction of the stomach wall. These effects were maximal 2 min after injection. Gastric secretion resumed 5-6 min after injection and the effects of the drug were no longer visible after 12-15 min. Bleeding due to simulated hemorrhagic gastritis stopped for 12 min after an injection; this is ascribed to constriction of the small vessels, muscular contraction of the stomach wall and reduction of secretion.

5147 ENZYME HISTOCHEMISTRY OF CHRONIC ATROPHIC GASTRITIS. *(E.)* Siegel, H. I. (New York Med. Coll., N. Y.), R. Lev and G. B. J. Glass. *Amer J Dig Dis* 13(11):974-986, 1968.

The localization and activity of hydrolytic and oxidative enzymes in the gastric mucosa under normal conditions and at various stages of atrophic gastritis were compared in biopsy specimens taken from 18 patients with a normal gastric mucosa, 13 with superficial gastritis, and 54 with chronic atrophic gastritis (including 28 with intestinal metaplasia). Histochemical determinations showed that the activity of acid phosphatase, β-glucuronidase, thiamine pyrophosphatase, adenosine triphosphatase, alkaline phosphatase, leucine aminopeptidase, lactic dehydrogenase, succinic dehydrogenase, diphosphopyridine nucleotide diaphorase and triphosphopyridine nucleotide diaphorase in the gastric surface epithelium varied directly with the severity of the atrophic gastritis. Treatment with prednisone (30 mg/day for 12-18 weeks) in 5 cases had no effect on the enzyme levels. Atrophic gastritis seems to begin with the appearance of patches of surface epithelium having the characteristics of a regenerating mucosa, suggesting prior injury to the neck and crypt areas. This is followed by a decrease in the numbers of chief and parietal cells and the development of an intestinalized mucosa containing numerous enzymes and acidic glycoproteins.

5148 AUTOANTIBODY-CONTAINING CELLS IN THE GASTRIC MUCOSA IN PERNICIOUS ANAEMIA. *(E.)* Baur, S. (Stanford U. Sch. Med., Palo Alto, Calif.), J. M. Fisher, R. G. Strickland and K. B. Taylor. *Lancet* 2(7574):887-890, 1968.

Using immunofluorescence microscopy, antibodies against a microsomal component of gastric parietal cells could be demonstrated in mononuclear inflammatory cells of the lamina propria (peroral gastric biopsy) in 6 of 7 pernicious anemia patients with circulating antibodies to this antigen; no antibody-containing cells were found in specimens from 2 pernicious anemia patients lacking these circulating antibodies or 2 patients with superficial gastritis but normal gastric secretion and vitamin B_{12} absorption. By means of radioautography following application of intrinsic factor-^{57}Co-B_{12} to the biopsy specimens, antibodies to Castle's intrinsic factor could be demonstrated in a few of the mononuclear inflammatory cells of the lamina propria in 2 of 3 pernicious anemia patients with high titers of circulating antibody to intrinsic factor; no antibody-containing cells were found in 7 other pernicious anemia patients (including 2 with low serum antibody titers) or the 2 patients with superficial gastritis.

5149 BLOCKING AND BINDING ANTIBODIES TO INTRINSIC FACTOR AND PARIETAL CELL ANTIBODY IN PERNICIOUS ANEMIA. *(E.)* Samloff, I. M. (U. Rochester Sch. Med. Dent., N. Y.), M. S. Kleinman, M. D. Turner, M. V. Sobel and G. H. Jeffries. *Gastroenterology* 55(5):575-583, 1968.

The overall incidence of blocking and binding antibodies to intrinsic factor in 137 patients (54 males and 83 females, including 26 with "definite", 30 with "probable", and 81 with "possible" pernicious anemia) was 70. 1% and 34.3%, resp.; the incidence of parietal cell antibody in 135 of these patients was 83.0%. Both blocking and binding antibodies were found in 33.6%; another 36.5% had only blocking antibody, 0.7% had only binding antibody, and 29.2% had neither intrinsic factor antibody. One or more of the 3 types of antibody was found in 95.5% of the patients. The incidence of the 3 antibodies was not significantly related to sex, duration of illness, or age. Binding antibody was significantly more common in patients with blood group O than in patients with blood group A; its titer was directly and significantly related to the concentration of blocking antibody. The concentration of blocking antibody was significantly higher in sera which also contained binding antibody than in sera with only blocking antibody. The incidence of parietal cell antibody was independent of the presenc or absence of intrinsic factor antibodies. These data suggest that the antigenic site on intrinsic factor for the blocking antibody may be a more potent immunogen than the corresponding site for binding antibody.

50 ROENTGEN EXPLORATION OF THE AFFERENT LOOP. *(E.)* Beranbaum, S. L. (New ork U.-Bellevue Med. Ctr., New York City), L. L. Lawrence nd S. Schwartz. *Radiology* 91(5):932-941, 1968.

he value of detailed radiological examination and the impor- nce of etiologic factors other than surgically-created anatomic bnormalities are emphasized on the basis of a review of 37 ases of afferent loop syndrome of varied etiology. As shown y the X-ray findings in these cases, the abnormalities which an cause epigastric pain and distension, with or without the ilious vomiting which is often considered typical of the af- erent loop syndrome, may be grouped into intrinsic abnor- alities, extrinsic abnormalities, and nonspecific motor dys- unction resulting in idiopathic dilatation of the afferent loop ne asymptomatic case). Intrinsic factors include inflammatory isease with or without demonstrable ulcer (13 cases), neo- lasms (7 cases), and prolapse or intussusception (2 cases). Ex- insic factors include inflammatory or adhesive complications 2 cases) and anatomic or mechanical causes such as iatrogenic erniation and/or knuckling (10 cases), a long afferent loop cases), and compression by the root of the mesentery (7 ases). In many patients, a combination of these factors may operative, and only meticulous X-ray examination can guar- ntee early recognition. Interval filming for stasis is considered be essential in every postoperative examination of the stomach.

151 NEURINOMA OF THE ANASTOMOSIS FOLLOWING GASTRECTOMY. *(Sp.)* Pujol oler and S. Bru Piquer. *Cir Ginec Urol* 21(4):535-537, 1968.

152 THE EFFECTS OF GASTRECTOMY ON THE GALLBLADDER. *(Fr.)* Leonard, P. (157 Blvd. rand-Whitlock, Brussels, Belgium). *Acta Gastroent Belg* 31(1): 7-76, 1968.

153 BILIARY STASIS FOLLOWING GASTRECTOMY. *(Fr.)* Lagache, G. (Gen. Surg. Clin., Hosp. Ctr., ille, France) and F. Leplat. *Acta Gastroent Belg* 31(2):134- 48, 1968.

154 ABERRANT PANCREATIC TISSUE IN THE STOMACH. *(Sw.)* Fasth, S. (Surg. Clin., kelleftea, Sweden). *Nord Med* 79(20):654-655, 1968.

155 THE ULTRASTRUCTURE OF THE GASTRIC MUCOSA IN PERNICIOUS ANEMIA. *(Ser.)* oljan, N. (Dr. M. Stojanović Gen. Hosp., Zagreb, Yugoslavia), . Milić, N. Sipuš and L. Pagon. *An Boln Dr. M. Stojanovic* (1):43-48, 1968.

156 THE SECRETORY AND EXCRETORY FUNCTIONS OF THE STOMACH IN PATIENTS WITH ASCHIN-BECK DISEASE. *(Rus.)* Miaki, A. E. (Chita Med. nst., USSR). *Klin Med (Moskva)* 46(7):95-98, 1968.

157 PROLAPSED GASTRIC MUCOSA. *(Rev.)(E.)* Abtahi, H. (Chicago Med. Sch., Ill.). *GP* 38(3): 02-106, 1968.

158 PALLIATIVE SURGERY FOR GASTRIC CANCER. *(Fr.)* Alexandre, J. H. (Broussais losp., Paris, France). *Entret Bichat (Chir)* pp. 27-30, 1968.

5159 THE ETIOLOGY OF DIVERTICULA AND PSEUDODIVERTICULA FORMATION IN THE STOMACH AND EFFERENT JEJUNAL LOOP FOLLOWING GASTRIC SURGERY. *(Ger.)* Richter, H. (Munic. Hosp., Solingen, Germany) and M. Wilhelm. *Chirurg* 39(10):458-461, 1968.

5160 BEHAVIOR OF SOME PHOSPHATASES IN THE SMALL INTESTINAL MUCOSA OF PATIENTS SUBJECTED TO GASTRECTOMY. *(Pol.)* Kalina, Z. (1st Clin. Int. Dis., Silesian Acad. Med., Katowice, Poland) and J. Jonek. *Pol Tyg Lek* 23(47):1799-1802, 1968.

5161 CHANGES IN THE LYMPHATIC SYSTEM OF THE HUMAN STOMACH DURING GASTRIC CANCER. *(Rus.)* Saf'iannikova, Ie. B. (I. M. Sechenov 1st Moscow Med. Inst., USSR). *Arkh Anat* 55(8):70-75, 1968.

5162 A NEW STAPLER FOR GASTRIC OPERATIONS. *(E.)* Jascalevich, M. E. (New Jersey Coll. Med., Jersey City). *Surgery* 62(6):1100-1101, 1967.

5163 CONGENITAL PYLORIC STENOSIS: ROENTGEN FINDINGS 52 YEARS AFTER GASTROENTEROSTOMY. *(E.)* Dickinson, S. J. (Lenox Hill Hosp., New York City) and E. E. Brandt. *Surgery* 62(6):1092-1099, 1967.

5164 A METHOD OF TOTAL GASTRECTOMY FOLLOWED BY A D-SHAPED ESOPHAGEAL ANASTOMOSIS. *(E.)* Daido, R. (Maizuru Natl. Hosp., Kyoto, Japan), M. Kano, K. Hirotani, Y. Nishio and M. Funada. *Surgery* 62(5):865-871, 1967.

5165 NEW INSTRUMENT FOR GENERAL SURGERY, ESPECIALLY FOR GASTRECTOMY. *(E.)* Pinotti, H. W. (Fac. Med., U. São Paulo, Brazil). *Surgery* 62(5): 975-977, 1967.

5166 DIFFERENCES IN LACTATE DEHYDROGENASE ISOENZYME PATTERNS IN EXPERIMENTAL LESIONS OF THE STOMACH. *(E.)* Procházka, B. (Inst. Exp. Path., Charles U., Prague, Czechoslovakia), J. Kohout, L. Korbová, V. Jirásek, V. Bárta and M. Procházková. *Canad J Biochem* 46(2):132-133, 1967.

5167 GASTRIC INTRINSIC FACTOR. *(E.)* Chanarin, I. *Gut* 9(4):373-35, 1968.

5168 EXPERIENCES IN EARLY GASTRIC CANCER WITH SPECIAL REFERENCE TO PREOPERATIVE DIAGNOSIS. *(E.)* Ono, G. (Dept. Int. Med., Shinshu U., Matsumoto, Japan), T. Kojima, J. Koshi, T. Kobayashi, K. Kashiwabara, K. Koitabashi and N. Nakajima. *Med J Shinshu U* 12(1):57-59, 1967.

5169 GASTRIC MUCOSAL FEATURES AFTER PYLOROPLASTY AND VAGOTOMY. *(E.)* Macleod, I. B. (U. Edinburgh Med. Sch. Scotland), D. J. C. Shearman, N. D. Finlayson and W. H. A. Macmahon. *Brit J Surg* 55(9):685-686, 1968.

5170 **DOUBLE BALLOON INFANT GASTROSTOMY TUBE.** *(E.)* Schneider, K. M. (Dept. Surg., Mount Sinai Sch. Med., New York City), J. M. Becker and I. H. Krasna. *J Pediat Surg* 3(4):512-513, 1968.

5171 **OBSTRUCTED VOLVULUS OF STOMACH IN A DIAPHRAGMATIC HERNIA: A POST-PARTUM EMERGENCY.** *(E.)* Foss M. V. L. (Whittington Hosp., London, England) and P. T. Savage. *Proc Roy Soc Med* 61(10):956-957, 1968.

5172 **PROLAPSED GASTRIC MUCOSA.** *(E.)* Abtahi, H. (Chicago Med. Sch., Ill.). *GP* 38(3):102-106, 1968.

5173 **RADIOLOGICAL FINDINGS IN SARCOMA OF THE STOMACH.** *(Ger.)* Wehling, H. (Inst. Radiol., U. Hamburg, Germany) and H. Wendenburg. *Aktuel Gastroent* pp. 320-321. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5174 **THE SURGICAL TREATMENT OF HYPERTROPHIC PYLORIC STENOSIS IN INFANTS.** *(Ger.)* Welz, K. (Cottbus Distr. Hosp., Germany). *Zbl Chir* 93(36):1231-1236, 1968.

5175 **PYLORIC STENOSIS AND INFECTION OF THE URINARY TRACT.** *(Ger.)* Nitsch, K. (DRK-Cecilien Found., Hannover, Germany). *Munchen Med Wschr* 110(40):2258-2261, 1968.

5176 **CONTRIBUTION TO THE CLINICAL CHARACTERISTICS AND TREATMENT OF ANASTOMOSITIS.** *(Ger.)* Eiermann, H. (Munic. Hosp., Baden-Baden, Germany) and G. Seiler. *Zbl Chir* 93(42):1473-1484, 1968.

5177 **SOME IATROGENIC COMPLICATIONS OF GASTRIC SURGERY.** *(E.)* Lahiri, T. K. (Newark Beth Israel Hosp., N. J.) and S. Diener. *J Newark Beth Israel Hosp* 19(2):73-87, 1968.

See also abstract nos.: 5081,5222,5232,5435

5178 **THE SIGNIFICANCE OF PERSISTING PROTRACTION DIVERTICULA OF THE SMALL INTESTINE.** *(E.)* Lasher, E. P. (U. Washington Sch. Med., Seattle). *Surg Gynec Obstet* 127(2):291-294, 1968.

A detailed study of the intestinal tract in 6 human embryos (5-25 mm long) revealed protraction diverticula only at a stage when lengthening had resulted in the extrusion of several loops of midgut into the umbilical stalk. At this stage, the duodenal lumen is discontinuous but no solid core or vacuolar formation was seen distal to this point. Two muscular coats were clearly forming in the rostral part of the mesoderm but were less evident in the hindgut. Crypts and semicircular folds were barely demonstrable, and the duodenal epithelium at this stage consisted of undifferentiated simple or stratified cuboidal formations. These diverticula, which vary in length from 30 to 160 microns and may be found anywhere in the distal small intestine, usually communicate proximally with the lumen. The arteries which occur near these diverticula have no distinctive pattern, and the diverticula do not necessarily occur adjacent to blood vessels. Those which persist are usually within or close to the mesentery, in which case they may be responsible for the development of peptic ulcers, followed in later life by bleeding, abdominal pain, and peritonitis in case of perforation; brief descriptions are provided for 9 such cases previously reported in the literature. In view of this danger, surgical removal is recommended whenever such diverticula are found. There is still insufficient evidence, however, to attribute extensive duplications of the small intestine to persistent protraction diverticula.

5179 **BROWN BOWEL.** *(E.)* Schnitzer, B. (VA Hosp., Ann Arbor, Mich.) and L. S. Loesel. *Amer J Clin Path* 50(4):433-439, 1968.

The smooth muscle of the small bowel was examined at necropsy in 55 cases of cystic fibrosis of the pancreas (CF), 41 cases of chronic pancreatitis (CP), and a 72-yr-old man with vitamin C deficiency. Ceroid was found in the small intestinal wall in 14 of 17 children with CF of at least 4 yr duration, compared to only 3 of 12 CF patients between the ages of 1 to 4 yr. Ceroid was also found in the patient with scurvy and in 15 of 41 cases of chronic pancreatitis. In cases where the ceroid was abundant, the pancreatitis was severe and steatorrhea and abnormal fat absorption or low plasma carotene levels were usually present. In a few cases of CP where the histologic changes were severe, pigment was not found in the small bowel wall. When ceroid pigment was present in abundance in the small bowel and distal esophagus, the smooth muscle of the entire gastrointestinal tract as well as histiocytes within the bowel wall contained pigment. Generalized deposits of ceroid were found in some cases. No significant histologic changes were seen in skeletal muscle, and ceroid was not present in skeletal or cardiac muscle. It is noted that prolonged malabsorption of fat may lead to a deficiency of vitamin E, which may be associated with the accumulation of ceroid pigment; vitamin C may also play a role in synergizing the antioxidant activity of tocopherol and thus preventing the formation of ceroid.

5180 **COMPARATIVE EFFECTS OF ENDOTOXIN ON CANINE AND PRIMATE INTESTINE.** *(E.)* Hinshaw, L. B. (VA Hosp., Oklahoma City). *J Surg Res* 8(11): 535-538, 1968.

To compare the responses of perfused monkey and dog intestine following lethal i.v. injection of *E. coli* endotoxin (5 mg/kg and 0.4 mg/kg, resp.), experiments were carried out on adult, anesthetized, partially enterectomized rhesus monkeys (6) and mongrel dogs (6). A loop of the isolated small intestine was perfused with blood obtained from the femoral artery. Studies were carried out for 2 hr after endotoxin injection. Mean systemic arterial pressures fell to identical minimal levels at 90 min postendotoxin. Mesenteric resistances were initially elevated in both species but differed markedly during the course of the experiment: resistance was maintained at elevated values in the dogs but fell markedly below control values in the monkeys. Intestinal weight increases after endotoxin injection in the dog greatly exceeded those in the monkey, which were modified only minimally. These results suggest significant differences between the responses of the splanchnic beds of dogs and monkeys to endotoxin and require further evaluation in terms of the pathogenesis of bacteremic shock in man.

5181 **EFFECTS OF NEOMYCIN ON DISACCHARIDASE ACTIVITY OF THE SMALL BOWEL.** *(E.)* Cain, G. D. (U. Texas Med. Branch, Galveston), E. B. Reiner and M. Patterson. *Arch Intern Med* 122(10):311-314, 1968.

Small-intestinal biopsy specimens from 5 healthy male subjects given 8 g of neomycin sulfate daily for 3 days were analyzed for disaccharidase activity by the Dahlqvist method. Antibiotic therapy reduced enzyme activity and induced lactose malabsorption *in vivo*, even though addition of 1% neomycin sulfate to the incubation medium had no effect on enzyme activity *in vitro*. Inconsistent stool lactic acid values were noted after treatment. Eosinophil and plasma cell infiltration of the lamina propria and villus blunting were observed by light microscopy. Disruption of the ''fuzzy surface'', scattered ballooning, fragmentation and occasional loss of microvilli were seen by electron microscopy. An early, direct, toxic action of neomycin on the small bowel mucosa is suggested by these observations.

5182 **JEJUNAL MORPHOLOGICAL CHARACTERISTICS IN SOUTH VIETNAMESE RESIDENTS: A PRELIMINARY REPORT.** *(E.)* Colwell, E. J. (Walter Reed Army Med. Ctr., Washington, D. C.), J. D. Welsh, L. J. Legters and R. F. Proctor. *JAMA* 206(10):2273-2276, 1968.

Marked differences with respect to villus dimensions and the histological characteristics of the jejunal mucosa were observed when jejunal biopsies from 16 South Vietnamese residing in the Mekong River delta (6 males and 10 females, 7-76 yr old) were compared with those from 13 white North American volunteers (8 men and 5 women, 22-64 yr old) who were asymptomatic and had no history of previous tropical exposure. In the Vietnamese, villus height was shorter and villus width was broader; the absolute crypt height was increased, variations in villus size and shape were more pronounced, and branching, fusion and knobbing of the villi were more frequent. Inflammatory infiltration of the lamina propria was also more frequent in Vietnamese, and the eosinophilic cellular content in tissue sections was greater. Differences between the arithmetic means for all mucosal dimensions in the 2 population groups were statistically highly significant, and the morphological alterations appeared to be independent of age or sex.

5183 PREVENTION OF THE NECROTIC HEMORRHAGIC ENTERITIS PRODUCED BY EXPERIMENTAL IRREVERSIBLE HYPOVOLEMIC SHOCK. *(Fr.)*

Tiberio, G. (Inst. Surg. Path., U. Milan, Italy), P. Cagliani, A. Parmeggiani, C. Albonico and E. Raffaglio. *Lyon Chir* 64(4): 605-614, 1968.

The pancreatic etiology of the hemorrhagic necrosis normally seen in the intestinal mucosa of dogs subjected to irreversible hypovolemic shock was confirmed by the fact that such necrosis did not develop in previously constructed ileal loops (40-50 cm in length) from which pancreatic enzymes were excluded. In these experiments, 15-20 days after construction of the ileal loop, dogs were bled at such a rate that the blood pressure fell to 30 mm Hg within 30-70 min; this was maintained for 30 min before being increased to 50 mm Hg, a level which was maintained for 2-4 fr before replacement of the total blood volume. In subsequent experiments, only mild regressive changes without true hemorrhagic necrosis occurred in the ileum of dogs subjected to hypovolemic shock following subtotal duodenopancreatectomy, and the survival time in such dogs was 18-26 hr after reestablishment of normal pressure compared to 8-20 hr in controls (shock without pancreatectomy). The absence of similar intestinal changes during shock in man is ascribed to the relatively greater secretory capacity of the pancreas in dogs, and it is suggested that pancreatectomized dogs might provide a better model for studies of hemorrhagic shock.

5184 A LIGHT- AND ELECTRON-MICROSCOPIC STUDY OF THE MORPHOLOGY OF THE SMALL INTESTINAL MUCOSA IN WHIPPLE'S DISEASE (INTESTINAL LIPODYSTROPHY). *(Ger.)*

Moppert, J. (Inst. Path., U. Freiburg i. Br., Germany), L. Bianchi and H. Buhler. *Virchow Arch Path Anat* 344(4):307-321, 1968.

Serial biopsies from the duodenum and jejunum (3 over a period of 4 months and 10 in 20 months, resp.) were taken before and after antibiotic therapy (tetracycline and semisynthetic penicillin) in 2 cases of Whipple's disease (men, 55-57 yr old). The diarrhea, steatorrhea and cachexia in both patients responded dramatically to a few days of antibiotic therapy, although one patient was never completely cured. This clinical improvement was accompanied by marked histological changes, with normalization of the microvilli, disappearance of histiocytic inclusion bodies, and characteristic sclerosis of the tunica propria. The fact that clinical improvement paralleled the disappearance of the microorganisms and set in much more rapidly than the normalization of the intestinal lymphatic system or deep mucosa confirms the importance of the superficial epithelium for intestinal lipid absorption. Before treatment, Gram-positive rods were particularly numerous in the subepithelial interstitium, often assuming a palisade-like orientation in the area of the capillary basal membranes and coming into direct contact with the pseudopodia of the PAS-positive histiocytes. Bacteria were also found in the cytoplasm of the Schwann cells of the autonomic nerves. These microorganisms are not believed to be the main factor in the etiology of Whipple's disease, in which age and sex play a definite role. However, the unusual chemical composition of their cell walls may well be the determining factor in the specific tissue reaction which is a characteristic of this disease.

5185 AN EFFECT OF CHOLERA TOXIN ON SMALL INTESTINE WITHOUT DIRECT MUCOSAL CONTACT. *(E.)*

Serebro, H. A. (Johns Hopkins U. Sch. Med., Baltimore, Md.), T. McGonagle, F. L. Iber, R. Royall and T. R. Hendrix. *Johns Hopkins Med J* 123(5):229-232, 1968.

To determine whether cholera exotoxin can act by a humoral route or only by direct mucosal contact, net fluid movement in two adjacent jejunal loops was measured simultaneously in 21 male New Zealand rabbits under pentobarbital anesthesia. One 15-cm loop was perfused with exotoxin (a 0.22 μ millipore filtrate of a 24-hr shaken culture of *Vibrio cholera,* strain Inaba 569B, grown in modified syncase broth), while the other was perfused with a similar solution (0.1% syncase) containing no exotoxin. Perfusion of a loop with crude cholera exotoxin resulted in a net secretion (as shown by a decrease in phenol red concentration) of 1.94-2.26 ml/cm/6 hr in the perfused loop and 0.091 ml/cm/6 hr in the adjacent control loop, compared to an absorption of 0.234 ml/cm/6 hr in jejunum perfused only with syncase. Histological examination revealed a normal jejunal mucosa in all cases. These studies suggest that either part of the exotoxin or a metabolite produced in the mucosa by the exotoxin is absorbed into the circulation and then alters the direction of fluid movement in the adjacent loop.

5186 REPORT OF 33 CASES OF ADULT DUODENAL STENOSIS, NOT INCLUDING ULCEROGENIC OR FUNCTIONAL STENOSES. *(Fr.)*

Gillet, M. (Hosp. Ctr., Strasbourg, France), M. Thomas, P. Haehnel and M. Adloff. *Acta Gastroent Belg* 31(7):435-464, 1968.

Among 33 patients (25 men and 8 women, 18-72 yr old but most between 50 and 60) treated for duodenal stenosis during a 10-yr period, the principal symptoms were those of high gastrointestinal obstruction, preceded or accompanied in 16 cases by jaundice. These symptoms, which depended more on the degree of stenosis than on the etiology, included pain in 19 cases, nausea and vomiting in 24, and weight loss in all. The underlying pathology, which is impossible to determine by X-ray, included 14 cases of pancreatic cancer, 7 of chronic pancreatitis, 4 of duodenal cancer, 2 tumors involving the ampulla of Vater, and 6 miscellaneous causes (tumors, foreign body, hematoma). All but one patient (a 45-yr-old woman treated with vinblastine for stenosis caused by retroperitoneal Hodgkin's disease) were treated surgically; in 30 cases the operation was an intestinal anastomosis, supplemented in 16 cases by biliodigestive anastomoses, while 2 other patients were treated by duodenopancreatectomy for cancer of the pancreas and sarcoma of the duodenum, respectively. In most cases, the long-term results could not be established. It is pointed out that the older procedure of duodenojejunostomy has been largely replaced by gastroenterostomy, and that duodenectomy or duodenopancreatectomy should be reserved for definite malignancies. The radiological signs, pathophysiology, etiology and surgical treatment of duodenal stenosis are reviewed in considerable detail.

5187 **ANOMALIES OF INTESTINAL ROTATION AND FIXATION.** *(E.)* Rees, J. R. (Cornell U. Med. Ctr., New York City) and S. F. Redo. *Amer J Surg* 116(6):834-841, 1968.

The anomalies of rotation and fixation of the midgut loop and its mesentery encountered in 40 patients are presented and classified according to a modification of the system of Bill and Grauman; 4 categories are proposed: 1) nonrotation, 2) incomplete rotation, 3) reversed rotation, and 4) anomalous fixation or fusion of the mesenteries. The patients are grouped according to age: 1) patients from birth to one yr of age, 2) those from one to 18 yr, and 3) those over 18. The most common anomaly in the first 2 groups was incomplete rotation. The patients presented with bile-stained vomit, distention and passage of meconium, and small bowel obstruction was the major radiographic finding; the Ladd operation was the primary surgical procedure. In the third group (12 patients), fixation and nonrotation were the most common findings and only one patient had surgery performed because of symptoms directly due to the anomaly. Peptic ulceration was observed in 4 of the 12 patients and gastrectomy was performed in 3 of them due to complications. There were no symptoms in 4 patients, indicating that the mere presence of these anomalies is not an indication for exploratory surgery.

5188 **DOSE-SURVIVAL CHARACTERISTICS OF EPITHELIAL CELLS OF MOUSE INTESTINAL MUCOSA.** *(E.)* Withers, H. R. (Natl. Cancer Inst., NIH, Bethesda, Md.) and M. M. Elkind. *Radiology* 91(5):998-1000, 1968.

Female hybrid (CDF_1) mice, age 13-18 weeks, were used to determine the dose-survival characteristics of the epithelial cells that form the mucosal lining of the small intestine in response to irradiation. A technique for cloning crypt cells of the mouse jejunum is described in which the islands of regenerating epithelium in the ulcerated mucosa are counted 13 days after exposure to doses of 1675-2375 r. Using this technique, the dose-survival curve for these cells was determined. The slope of the exponential portion of the survival curve was found to be fairly steep (D_0 = 100 r), but the capacity of these cells for repair of sublethal injury, as determined by dose fractionation methods, appears to be large. The significance to radiotherapy of the patterns of recovery exhibited by several different types of cells during the first 14 hr after irradiation is briefly discussed.

5189 **JEJUNAL OBSTRUCTION DUE TO TUMOR.** *(Sp.)* Castellon, R. *Cir Ginec Urol* 21(4):501-503, 1968.

5190 **INFARCTION OF THE SMALL INTESTINE IN CHILDREN.** *(Pol.)* Sztaba, R. (Pediat. Surg. Clin., Gdansk, Poland), R. Gross and E. Labun. *Pol Przegl Chir* 40(7):759-762, 1968.

5191 **A DIVERTICULUM OF THE FOURTH SEGMENT OF THE DUODENUM.** *(It.)* Mantonico-Santoro, M. (United Hosp., Naples, Italy). *Rass Int Clin Ter* 48(11):679-686, 1968.

5192 **CONTRIBUTION TO THE CLINICAL CHARACTERISTICS AND DIAGNOSIS OF DUODENAL DIVERTICULA.** *(It.)* Donini, I. (Inst. Gen. Clin. Surg., U. Genoa, Italy), G. L. Petrilli and L. Pavacci. *Rass Arch Chir* 6(3):117-130, 1968.

5193 **TWO CASES OF PARTIAL OCCLUSION OF THE SMALL INTESTINE.** *(Por.)* Ayres da Silva (Pediat. Clin., U. Lisbon, Portugal) and Rosa de Oliveira. *Rev Port Pediat* 30(11):328-335, 1967.

5194 **THE PEUTZ-JEGHERS SYNDROME.** *(Sp.)* Miyar Gonzalez, A. (Nuestra Senora de Covadonga Sanit., Oviedo, Spain). *Cir Ginec Urol* 22(3):414-417, 1968.

5195 **TWO CASES OF OBSTRUCTION DUE TO STRANGULATED HERNIA.** *(Fr.)* Soustelle, J., R. Bertocchi and Y. Sauvage. *Lyon Chir* 64(4):644-645, 1968.

5196 **STUDIES ON THE BEHAVIOR OF THE MESENTERIC SMALL INTESTINE IN THE AGED.** *(It.)* Vannini, P. (Inst. Gen. Clin. Med., U. Bologna, Italy), L. Rosa, L. Gandolfi, G. Gasbarrini, S. Moretti, L. Frizziero and R. Ciusa. *G Geront* 15(9):1089-1122, 1967.

5197 **SURGICAL PRESENTATION OF SYSTEMIC SCLEROSIS OF THE SMALL INTESTINE.** *(E.)* Nash, A. G. (Royal Free Hosp., London, England) and R. Fountain. *Brit J Surg* 55(9):667-672, 1968.

5198 **SMALL BOWEL INJURY AS A FACTOR IN THE DUMPING SYNDROME.** *(E.)* Butt, K. (State U. New York Downstate Med. Ctr., Brooklyn), P. K. Kottmeier, J. Adamsons, J. Fitzgerald, G. Brandwein, E. F. McNally and C. Dennis. *Surgery* 62(4):572-580, 1967.

5199 **ILEAL ENDOMETRIOSIS AS A SURGICAL EMERGENCY.** *(E.)* Duari, M. (Gen. Hosp., Burnley, England). *J Roy Coll Surg Edinb* 13(5):276-282, 1968.

5200 **RESECTION AND END-TO-END ANASTOMOSIS IN THE MANAGEMENT OF ATRESIA AND STENOSIS OF THE SMALL BOWEL.** *(E.)* Louw, J. H. (Dept. Surg., U. Cape Town, South Africa). *Surgery* 62(5):940-959, 1967.

5201 **THE EFFECT OF EXPERIMENTAL LIGATION OF THE SUPERIOR MESENTERIC ARTERY ON SERUM XANTHINE OXIDASE AND TRANSAMINASE ACTIVITY.** *(E.)* Dagher, F. J. (Amer. U. Beirut, Lebanon), A. Panossian and S. Saab. *Surgery* 62(6):1044-1050, 1967.

5202 **THE EFFECT OF HYPERTONIC MANNITOL ON THE INTESTINE OF MAN.** *(E.)* Nasrallah, S. M. (Johns Hopkins U. Sch. Med., Baltimore, Md.), W. M. Coburn and F. L. Iber. *Johns Hopkins Med J* 123(3):134-137, 1968.

5203 **THE SOURCE OF DUODENAL ASPIRATE IN MAN.** *(E.)* Wormsley, K. G. (Royal Infirm., Sheffield, England). *Gut* 9(4):398-404, 1968.

5204 **MANAGEMENT AFTER MASSIVE RESECTION OF THE INTESTINE.** *(E.)* Preston, F. W.

(Northwestern U. Med. Sch., Chicago, Ill.) and Z. G. Asuncion. *Surg Clin N Amer* 48(4):931-940, 1968.

5205 **EXPERIMENTAL AND CLINICAL STUDIES ON SMALL INTESTINAL ANTIPERISTALSIS.** *(Ger.)* Heinisch, H. M. (Pediat. Clin., U. Cologne, Germany). *Aktuel Gastroent* pp. 328-330. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5206 **THE CONSEQUENCES OF EXTENSIVE RESECTION OF THE SMALL INTESTINE.** *(Ger.)* Scheibe, O. (Surg. Clin., Med. Acad. Lübeck, Germany), O. Kuhlke and J. Weinreich. *Aktuel Gastroent* pp. 331-333. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5207 **INTESTINAL LYMPHANGIECTASIA WITH HYPOMAGNESAEMIC TETANY.** *(E.)* Zimmet, P. (Alfred Hosp., Melbourne, Australia) and H. D. Breidahl. *Aust Ann Med* 17(3):265-269, 1968.

5208 **LIGNIN: A BILE-SALT SEQUESTRATING AGENT.** *(E.)* Eastwood, M. A. (Royal Infirm., Edinburgh, Scotland) and R. H. Girdwood. *Lancet* 2(7579): 1170-1172, 1968.

5209 **SOLITARY INTESTINAL VASCULAR TUMOUR PRESENTING AS AN ACUTE INTESTINAL OBSTRUCTION.** *(E.)* Mukherjee, S. K. (Hartlepool Gen. Hosp., England). *Brit J Clin Pract* 22(10):433-436, 1968.

5210 **CONGENITAL MEGADUODENUM: DISCUSSION AND CASE REPORT.** *(Fr.)* Bleiberg, H. (Mons, France), P. Mainguet, O. Thys and J. Lahaut. *Lille Med* 13(7):766-768, 1968.

5211 **EXTERNAL FISTULAS OF THE SMALL INTESTINE.** *(E.)* Braasch, J. W. (Lahey Clin., Boston, Mass.) and W. R. Nickerson. *Lahey Clin Found Bull* 17(4):149-154, 1968.

5212 **TUMORS OF THE SMALL INTESTINE.** *(Sp.)* Meeroff, M. (Prof. Dr. Gregorio Araoz Alfaro Polyclin., Lanus, Argentina). *Hispalis Med* 25(590):537-560, 1968.

See also abstract nos.: 4695,4849,5150

213 PEPTIC ULCERATION: INFLUENCE OF DUODENAL ACIDIFICATION. *(E.)* Gold, D. (U. Texas Med. Br., Galveston) and E. J. N. Poth. *Amer J Surg* 16(5):750-754, 1968.

Single ulcers developed in the proximal end of the interposed leal segments in 11 of 12 healthy dogs (maintained on a single laily feeding of a specially controlled diet) in which anastomoses had been created between the pylorus and the proximal luodenum 2 months before (type A preparation), compared o only 7 of 23 dogs in which anastomoses had been created etween the pylorus and the distal duodenum (type B preparaion); in the latter 7 dogs, when the ulcers were resected and he ileal segments were reanastomosed to the stomach, recurent ulcers developed within 2 months in 2 cases. The 15 renaining type B preparations were converted to type A preparations, after which ulcers developed in 1 of 7 which had had a ype B preparation for 4 months and in 4 of 8 which had had type B preparation for only 2 months. In 9 dogs with type B preparations, the duodenal flow was reversed by anastomosing the proximal jejunum to the proximal duodenum, leaving he ileal segment connected to the distal duodenum (now in he proximal position); no new ulcers developed in 4-7 months f observation, and 3 existing ileal ulcers healed. It is suggested hat the continuous acidification of the duodenum in this type f preparation stimulates the release of secretin and enteroastrone, thus significantly suppressing gastric secretion. Inhiition of gastric secretion is less in type A preparations because f the smaller area of duodenal mucosa exposed to acid.

214 CLINICAL SIGNS AND TREATMENT IN 24 CASES OF GASTRODUODENAL PERFORATION. *(Turk.)* Yaycioglu, A. (Med. Fac., Ankara U., Turkey), M. Onat and O. Ozbal. *Tip Fac Mec* 21(1):124-132, 1968.

During the period 1960-66, 24 patients (22 males and 2 females, 6 between the ages of 20 and 40) with perforated peptic ulcers 3 gastric and 21 duodenal) were admitted to the First Surgical Clinic of Ankara University. The largest number of perforations ccurred in March and October, and between the hours of 2:00 nd 7:30 P.M., with smaller peaks during June and December nd in the early morning hours. Although 17 patients had a ypical ulcer history, 7 had no previous symptoms. Physical xamination revealed abdominal rigidity and epigastric pain in most cases, and free air under the diaphragm in 16. All of the atients were treated surgically (gastrectomy in 10, primary uture in 14) within 2-24 hr after admission. There was only ne death (a 70-yr-old patient who died of cor pulmonale folowing primary suture).

215 INDOMETHACIN: EFFECT ON GASTRIC SECRETION, PARIETAL CELL POPULATION, AND ULCER PROVOCATION IN THE DOG. *(E.)* Nicoloff, D. M. (Minneapolis VA Hosp., Minn.). *Arch Surg* 97(5):809-15, 1968.

Experiments were performed on a total of 90 dogs to elucidate he effect of oral indomethacin on gastric secretion and the astric mucosa. Among 40 dogs given 2, 3, 4 or 5 mg/kg/day or 30 days, all developed melena within the 1st week and 36 all except 4 at the lowest dosage) developed antral ulcers, but there were no duodenal ulcers; perforation occurred in 20-90% of the animals in direct dependence on the dose. When 11 dogs were given 2 mg/kg/day for 30 days in combination with 30 mg/day of histamine s.c., they developed melena and died much faster than 10 dogs given histamine alone; antral ulcers developed in 8 of 11 and 0 of 10, duodenal ulcers in 3 of 11 and 6 of 10, and perforation in 4 of 11 and 1 of 10. In 6 dogs with vagally-denervated fundic pouches, administration of 2-3 mg/kg/day for 20 days consistently decreased the volume of gastric secretion, the free acid and the acidity, and 2 of 3 dogs later given 4-6 mg/kg/day for another 20 days became achlorhydric; all 6 dogs developed antral ulcers. As shown by gastric and hepatic biopsies and liver function tests, 4-5 mg/kg/day for 21 days had no consistent effect on the gastric mucosal cell count, thickness, or content of PAS-positive material, nor on liver histology or serum bilirubin, alkaline phosphatase or cephalin flocculation, although there was a moderate increase in BSP retention lasting 2 weeks and 16 of the 18 dogs developed antral ulcers. No antral ulcers developed, on the other hand, in 5 dogs given 5 mg/kg/day for 21 days after creation of an antral fistula plus gastrojejunostomy; instead, jejunal ulcers developed at the site of anastomosis in 3 cases. These results indicate that ulceration caused by indomethacin is due to progressive necrosis with erosion of the glands in the antral mucosa.

5216 GASTROENTEROSTOMY AND VAGOTOMY IN THE TREATMENT OF DUODENAL ULCER DISEASE. *(E.)* Grafe, W. R. (New York Hosp., Cornell Med. Ctr., New York City), W. Loehr and B. Thorbjarnarson. *Ann Surg* 168(6):966-970, 1968.

The results of gastroenterostomy and vagotomy for duodenal ulcer disease were evaluated in 110 patients (78 men and 32 women, 22-77 yr old, average 52 yr), followed from 2 to 18 yr postoperatively with an average follow-up of 56 months. The mortality was 0.91% and the morbidity 14.5%. An excellent result was obtained in 68%, a good result in 24%, and an unsatisfactory result in 8%. Eight patients (7.3% of the total) developed recurrent ulceration, and 5 of these required subsequent gastric resection. Mild dumping symptoms occurred in 7% of the patients. Gastroenterostomy and vagotomy may yield satisfactory results in cases of duodenal ulcer with specific contraindications to gastric resection.

5217 RADIOTELEMETERING STUDIES OF JEJUNAL pH BEFORE AND AFTER VAGOTOMY AND PYLOROPLASTY. *(E.)* Maxwell, J. D. (Royal Infirm., Glasgow, Scotland), W. C. Watson, J. K. Watt and A. Ferguson. *Gut* 9(5):612-616, 1968.

Jejunal pH was studied by radiotelemetry in 9 males with chronic duodenal ulcer disease, both before and 6-8 weeks after total vagotomy and pyloroplasty. After operation, the mean lowest jejunal pH rose significantly from 4.6 to 6.3, there was a significant increase in the percentage of time jejunal pH was at or above pH 6, and there was a significant reduction in the frequency of acid waves. There was no change in the frequency of alkaline waves, in the response to intrajejunal acid infusion, or in the pH rise following intravenous secretin following operation. It was felt that the changes in jejunal pH occurring after vagotomy and drainage procedures are in a direction likely to enhance rather than inhibit the physiological processes of digestion and absorption, and are unlikely to contribute to the disorders of small bowel function observed after these operations.

5218 **ACID REBOUND.** *(E.)* Fordtran, J. S. (U. Texas Southwest. Med. Sch., Dallas). *New Eng J Med* 279(17):900-905, 1968.

A search for rebound gastric hypersecretion after ingestion of antacids in 24 patients with chronic duodenal ulcer revealed that aluminum-magnesium hydroxide (in a dose of 30 or 60 ml) and sodium bicarbonate (in a dose of 4 or 8 g) failed to stimulate gastric secretion. By contrast, calcium carbonate (4 or 8 g) induced gastric hypersecretion in all cases. Detailed studies in 1 patient suggested that the stimulatory effect of calcium carbonate is mediated by the action of calcium ions within the gastrointestinal tract and that this action is markedly potentiated by food. Although calcium carbonate therapy increases serum calcium concentration, the data suggest that hypercalcemia is not the mechanism by which this antacid stimulates gastric secretion.

5219 **SMALL-INTESTINAL ULCERS INDUCED BY POTASSIUM.** *(Sw.)* Räf, L. E. (Serafim Hosp., Stockholm, Sweden). *Lakartidningen* 65(5):461-475, 1968.

Experiments in dogs, as well as in other experimental animals, have confirmed that 10% KCl solutions (in contrast to NaCl) will produce ulceration in the small intestine, and that ulcers can be produced by oral administration of enteric-coated KCl (6 g/day for 5 days); in 2 of 15 such dogs, histopathological studies revealed circumferential ulcers consisting of circumscribed areas of mucosal necrosis with pronounced edema and inflammatory cellular infiltration of the submucosa. A retrospective study of 127 cases of "nonspecific" small-intestinal ulcers encountered in greater Stockholm during 1954-65 revealed a variety of possible etiological factors, the most common of which was enteric-coated potassium therapy (62 cases); these 62 cases (33 men and 29 women, 29-87 yr old) represented nearly two-thirds of the 95 patients with ulcer-induced stenosis. The incidence of such ulcers was very low in 1954-59 and reached a maximum of 15/year (1.1/100,000 of the population) in 1964, but even this represented less than one out of every 1300 people treated with enteric-coated KCl during the year. However, KCl-induced ulcers accounted for nearly 10% of all persons operated on for small bowel obstruction in 1964. The 62 cases discussed showed a peak incidence age of 60-69 yr, and all but 6 cases were 50 or over; there were 59 cases of stenosis and 3 of perforation. Most of these patients had also received diuretics, and most had been treated for more than 6 months, but overdosage was rare and some had been treated for very brief periods. Pathologically, the ulcers resemble those seen in dogs, but the precise etiology remains unclear. Ulcers were found in all parts of the lower small intestine, from 40 cm below the ligament of Treitz to 5 cm above the ileocecal valve, but a large number were concentrated around 100 cm from the cecum. The diagnosis, treatment and prognosis of these ulcers are briefly discussed, and it is suggested that their incidence might be reduced by the use of the newer "slow-release" preparations, particularly if given after meals to reduce the KCl concentration reached in the small intestine.

5220 **A LONG-TERM FOLLOW-UP OF 102 CASES OF PERFORATED GASTRODUODENAL ULCERS TREATED BY SUTURE.** *(It.)* Salvadori, B. (Fatebenefratelli-Fatebenesorelle Hosp., Milan, Italy) and W. Rossi. *Chir Ital* 19(3):327-336, 1967.

Among the 102 cases of perforated peptic ulcer treated by suture during the period 1960-64, 87 (63 duodenal and 24 gastric) could be followed for 2-5 yr after successful surgery. All but 5 of these 87 patients were males, with a peak incidenc age of 20-40 yr for duodenal ulcer (31 of the 63 cases) and 40-60 yr for gastric ulcer (13 of the 24 cases). The operative mortality was 2.9% (3 deaths in patients aged 72-85 yr). Reoperation (gastrectomy or pyloroplasty + vagotomy) was performed within 3 months to 2 yr in 28 cases of duodenal ulcer (44.4%) and 9 cases of gastric ulcer (30.7%), including 2 treate for stomach cancer, although only 28 of these 37 patients actually had recurrent ulcer symptoms. Among the 50 other patients, 23 (15 duodenal and 8 gastric, only 3 of whom were below 30 yr of age) were asymptomatic and 27 had symptoms which were controlled by diet and medical therapy. Radiology revealed an ulcer niche in only 7 of these 27 patients. These results are in general agreement with those in the literature.

5221 **THE PEPTIC ULCER PROBLEM IN THE CENTRAL MILITARY HOSPITAL, MEXICO.** *(Sp.)* Garcia Carrizosa, R. (Cent. Milit. Hosp., Mexico City). *Cir Cir* 36(4):331-381, 1968.

The 423 patients treated for confirmed peptic ulcer at the Central Military Hospital during 1963-67 represented only 0.75 of the 56,535 patients seen during this 5-yr period, although another 218 patients had suspected peptic ulcers. The confirmed group included 99 gastric ulcers and 344 duodenal ulce (including 9 pyloric ulcers), 20 patients having both gastric an duodenal ulcers. Whereas the sex ratio in gastric ulcer was 1.6 (61/38), that in duodenal ulcer was 3.0 (258/86). The average age was 47.2 yr, with a peak incidence between the ages of 40 and 60; 17 patients were below 20 and 30 patients were above 70 yr of age. In 214 cases there was a previous history of ulcers, while 70 had previous upper gastrointestinal bleeding. Two patients with gastric ulcer and one with duodenal ulcer had had a gastroenterostomy, one patient with duodenal ulcer also had carcinoma of the pancreas, and in 3 cases the ulcer was ascribed to stress; 19 patients had concomitant cholecystitis, 9 had cirrhosis and 4 had liver abscesses. Complications included upper gastrointestinal bleeding in 141 cases (39 gastric and 102 duodenal), perforation in 17 cases (2 gastric and 15 duodenal), and pyloric obstruction in 18 cases (including 9 pyloric ulcers). Gastric analysis revealed hyperacidity in 24 of 44 cases of gastric ulcer and 149 of 183 cases of duodenal ulcer. Surgery was resorted to in 201 cases, including 122 (10 duodenal and 16 gastric) treated by antrectomy and vagotomy 52 (23 duodenal and 29 gastric) treated by subtotal gastrecton 4(2 of each type) treated by vagotomy and gastroenterostomy and 7 (6 duodenal and 1 gastric) treated by vagotomy and pyloroplasty; in addition, 20 patients received a cholecystectomy for cholecystitis (and 11 of these also received pyloroplasty for duodenal ulcer), 8 received treatment for associated hiatus hernia, and 17 had suture for perforated ulcers. Postoperative complications included residual abscess, hepatic coma, upper gastrointestinal bleeding, postoperative hemorrhage, bronchopneumonia, and shock (5 cases each), as well as 3 cases of "dumping", 3 of necrosis of the duodenal stump, 2 of pancreatitis, 1 of peritonitis, and 1 of obstructive jaundice. There were 15 deaths among the 201 surgical patients and 6 other deaths, yielding an overall mortality of 4.9%. Postoperative X-ray showed a satisfactory picture in 104 out of 114 cases, while the Hollander test in 74 patients subjected to antrectomy and vagotomy revealed achlorhydria in 39 and hypoacidity in 35. Histopathological studies in 94 surgically treated patients revealed 47 cases of chronic gastritis, 34 of benign gastric ulcer, 2 of duodenitis, and 11 duodenal ulcer patients with normal gastric mucosa. Among the entire group of 423 patients, 228 were discharged as "improved", 163 as "cured", 11 as "unchanged", and 21 died. The surgical procedures of choice are concluded to be antrectomy and vagotomy for duodenal ulcer and Hoffmeister partial gastrectomy for gastric ulcer.

5222 PRIMARY CARCINOMA OF THE GASTRIC STUMP FOLLOWING RESECTION FOR ULCER.

(Ger.) Kronberger, L. (Surg. Clin., U. Graz, Austria) and H. Hafner. *Chirurg* 39(3):118-122, 1968.

During the period 1948-66, when 2624 partial gastrectomies were performed for peptic ulcer at the Graz Surgical Clinic, 29 patients (25 men and 4 women, 38-83 yr old but most between 50 and 70) were admitted with primary carcinoma of the gastric stump; 23 of these 29 patients were admitted during the 2nd half of this period. All of these patients had originally been subjected to Billroth II gastrectomy for benign peptic ulcer (23 gastric and 6 duodenal) 9-40 yr (average 24.4 yr) before; in 18 cases the interval between peptic ulcer surgery and admission was 21-35 yr. The duration of recurrent symptoms before hospitalization varied from 1 month to 4 yr, and there were no symptoms which can be considered typical of stomach cancer. In 17 cases the cancer was located mainly in the area of the anastomosis, while in 9 others it affected only the residual stomach segment. Radical surgery was possible in only 14 cases (including 11 total gastrectomies), while 4 others received a palliative jejunostomy and the other 11 were beyond help. Postoperative mortality after radical surgery was 50%, due mostly to pneumonia and heart failure, and 3 other patients died of cachexia shortly after exploratory or palliative surgery. Among the 7 remaining patients treated by radical surgery, 3 died in 6-30 months, 1 was lost to follow-up, and 3 were alive after 13-30 months. The average survival time after palliative surgery was 5.2 months (maximum 6 months).

5223 THE VASCULAR PATHOGENESIS OF DUODENAL ULCERS.

(Rum.) Baciu, Z. (Med. Inst., Cluj, Romania), R. Sovrea and M. Zirbo. *Fiziol Norm Pat* 14(3):215-223, 1968.

Comparative studies of the capillary permeability for serum-protein macromolecules, using the cantharidin test, in 35 patients with active duodenal ulcers (20-40 yr old) and 10 healthy controls showed that the capillary permeability was significantly increased in 80% of the ulcer patients. Thus, even though the total serum protein and serum albumin were lower in the ulcer patients (7.45 g% and 3.8 g%, resp.) than in controls (8.2 and 4.77 g%, resp.), the protein and albumin levels found in the cantharidin vesicle exudate were higher in the ulcer patients (5.95 and 3.29 g%, resp.) than in controls (4.88 and 2.70 g%, resp.). The permeability coefficients, calculated as $(E/S)/(1-E/S)$ where E is the exudate concentration and S is the serum concentration, were 3.8-7.2 times as high in the duodenal ulcer patients (13.0 for albumin, 6.1 for gamma-globulin, 6.0 for total protein, 4.6 for alpha-2 globulin) as in controls (1.8 for albumin, 1.0 for gamma-globulin, 1.2 for total protein, and 1.2 for alpha-2-globulin). This indicates that the transport of protein from the blood stream into the cantharidin vesicle is significantly greater in ulcer patients. It is suggested that disturbances in the microcirculation of the gastric mucosa may play a role in the pathogenesis of peptic ulcer disease.

5224 AN ULCER FAMILY 20 YEARS LATER.

(Dan.) Nielsen, K. R. (St. Elisabeths Hosp., Copenhagen, Denmark). *Nord Med* 79(11):355-357, 1968.

A follow-up report is presented on the 4th and 5th generations of a Danish family originally reported by Helweg-Larsen in 1946 (*Acta Med Scand* 125:63, 1946), in which there was an unusually high incidence of gastroduodenitis and duodenal ulcer in 3 successive generations (including 6 of the 9 children of a woman with mild-moderate gastroduodenitis, 3 of whose 6 siblings also had gastroduodenal disease, 3 of the 4 children of another similar woman, 6 of the 10 children of a woman with definite gastroduodenal disease, and 3 of the 5 children of a couple who both had definite gastroduodenal disease). The present study revealed 4 new cases of radiologically confirmed duodenal ulcer and 2 new cases of gastroduodenitis among the 47 members of the 4th generation (mean age 50 yr), among whom there had been 7 previous cases of gastroduodenal disease, and a single case of duodenal ulcer among the 84 members of the 5th generation (mean age 28 yr). Most of the more recent offspring and grandchildren of patients with gastroduodenal disease were, however, apparently normal. These results are said to provide further evidence of a familial predisposition to peptic ulcer and gastroenteritis, but they fail to confirm Helweg-Larsen's earlier hypothesis of a dominant inheritance.

5225 SITE AND LOCALIZATION OF DUODENAL ULCERS: A STUDY AT OPERATION.

(E.) Kirk, R. M. (Hampstead Gen. Hosp., London, England). *Gut* 9(4):414-419, 1968.

In 50 patients affected by duodenal ulceration and in 100 unaffected patients, the duodenal bulb was studied at operation for local factors which predispose to peptic ulceration. Duodenal ulcers were confirmed to lie close to the pylorus, either on the anterior or posterior duodenal walls, usually between the superior and inferior borders. No anatomical feature was detected which could explain the site and localization of duodenal ulcers. Hydrochloric acid (N/10) applied locally to normal mucosa and into ulcer bases gave an indefinite response. External compression of the duodenal bulb was thought to be an unlikely localizing factor for ulceration. The effect of trauma from an acid jet stream emerging through the spout-like pylorus would be unlikely to impinge on the proximal duodenal wall at the usual site of ulceration. Chronic ulcers appeared to lie well out of the line of an acid stream. Traction on the stomach caused an area of pallor on the anterior duodenal wall in 81% of the 100 unaffected patients, and caused a local rise in duodenal tissue tension, with emptying of the small vessels. Local tension on the bowel wall, resisted by the submucous coat, results from distraction of a small segment of duodenal wall between the diffusely inserted hepatoduodenal ligament and the thick-walled pyloric antrum. Tension was felt, but ischemia could not be observed, at the point on the posterior duodenal wall corresponding to the usual site of posterior ulcers. Although mucosal pallor was not seen with applied traction, it is possible that an erosion is converted into a chronic ulcer if there is ischemia in the base.

5226 COARSE DUODENAL FOLDS IN PATIENTS WITH PEPTIC ULCER. *(E.)* Rhodes, J. (Welsh Natl. Sch. Med., Cardiff, Wales), J. H. Lawrie and K. T. Evans. *Gut* 9(5):609-611, 1968.

Barium meal radiographs from 102 patients (88 with duodenal ulcer, 14 with gastric ulcer) were studied to determine the incidence of coarse duodenal folds. At the same time, gastric acid secretion was measured by the histamine infusion technique. Among the 88 patients with duodenal ulcers, 22 had coarse duodenal folds (25%) and in 6 the folds were marked. In the patients with normal folds, the acid secretion was 40.3 ± 13.8 mEq/hr, while in those with coarse folds the acid secretion was 45.8 ± 10.1 mEq/hr (normal 24.9 ± 2.2 mEq/hr); this difference was not significant. Five of the 6 patients with marked folds had acid secretions greater than 57 mEq/hr. Only 3 patients had both coarse duodenal and jejunal folds. In the 14 patients with gastric ulcer, the acid secretion was 20.8 ± 6.2 mEq/hr. Only 2 had coarse duodenal folds and in both of them the acid output was high (greater than 35 mEq/hr).

5227 BLOOD CHANGES EIGHT YEARS AFTER VAGOTOMY WITH GASTROJEJUNOSTOMY COMPARED WITH THOSE AFTER POLYA PARTIAL GASTRECTOMY. *(E.)* Cox, A. G. (Western Infirm., Glasgow, Scotland), H. E. Hutchinson and C. A. J. Wardrop. *Gut* 9(4): 411-413, 1968.

A hematological study (hemoglobin, packed cell volume, mean corpuscular hemoglobin concentration, serum vitamin B_{12}, serum folate, and serum iron and total iron-binding capacity) was made in 107 men more than 8 yr after surgery (Polya partial gastrectomy or vagotomy with gastrojejunostomy) for chronic duodenal ulcers. A true comparison of the 2 different procedures was possible since the choice of operation had been made randomly, approximately half of the patients receiving each procedure. The mean ages, weights, and heights were almost identical in the 2 groups. Each group was also compared with an unselected series of men with unoperated chronic duodenal ulcer. Each hematological measurement revealed an advantage for vagotomy with gastrojejunostomy over partial gastrectomy. The differences were generally small, but statistically significant. With the exception of total iron-binding capacity in the vagotomized patients, all values in the postoperative patients were significantly lower than in the unoperated patients. This study tends to confirm the belief that vagotomy results in a lower incidence of hematological abnormalities than Polya partial gastrectomy.

5228 PSYCHOTHERAPY AND MEDICAL TREATMENT FOR DUODENAL ULCER COMPARED USING THE AUGMENTED HISTAMINE TEST. *(E.)* Glen, A. I. M. (Dept. Surg., U. Glasgow, Scotland). *J Psychosom Res* 12(2):163-169, 1968.

Among 142 patients referred for dyspepsia who fulfilled the initial criteria for inclusion in the trial (under 40 yr of age with at least a 1-yr history of symptoms and radiological evidence of an ulcer crater in the duodenum or persistent deformity of the duodenal cap), 38 were excluded for minor reasons and 104 were assigned to either medical treatment (diet and alkali) or psychotherapy (weekly 1-hr sessions for 6 months) on the basis of a quota allocation system which balanced the groups for age, sex, intelligence, smoking habits, duration of symptoms, and initial maximal acid output (augmented histamine test). Among the first 60 such patients, 45 (37 men and 8 women, mean age 28.1 yr) successfully completed the trial (24 of 31 given psychotherapy and 21 of 29 treated medically). The mean duration of symptoms in these patients was 5.3 yr and the mean initial maximal acid output was 13.8 mEq/30 min. Eighteen months later, the mean maximal acid output in the psychotherapy group had fallen from 14.3 to 13.7 mEq/30 min while that for the medical group had risen from 13.1 to 14.3 mEq/30 min; however, neither change was significant, and there was no significant difference between the 2 groups. In both groups, the test-retest variance was significantly greater at intervals of 18 months than at intervals of 8 or 10 months. This increase in variance is concluded to be time dependent and unrelated to therapy.

5229 VAGOTOMY AND ACID SECRETION IN PATIENTS WITH GASTRIC ULCER. *(E.)* Giles, G. R. (Dept. Surg., U. Leeds, England), M. C. Mason and C. G. Clark. *Lancet* 2(7563):306-309, 1968.

Studies of gastric acid secretion were carried out preoperatively in 18 controls and 25 patients (17 males and 8 females) with gastric ulcer, including 7 males with combined gastric ulcers and ulceration, scarring or deformation of the duodenum. Antral secretory function was estimated by measuring the secretory response to gastric instillation of 100 ml meat extract, while the maximal secretory capacity was estimated during a 1-hr continuous infusion of histamine acid phosphate (0.04 mg/kg/hr i.v.). In 18 cases (all 7 with duodenal lesions and 11 of the others), these studies plus an insulin test (secretory response to 0.15 U/kg i.v.) were repeated following vagotomy and pyloroplasty. Preoperatively, basal achlorhydria was noted in 7 gastric ulcer patients, 1 patient with a duodenal lesion, and 2 controls, and the mean basal acid secretion was 1.0 mEq/15 min (range 0-3.5) in the 7 patients with duodenal lesions compared to 0.5 mEq/15 min (range 0-1.9) in the others and in controls. The antral response was negative in 10 of 18 gastric ulcer patients and 4 of 18 controls (none of the duodenal ulcer cases) and the mean maximal secretory capacity was 5.0, 5.8 and 10.2 mEq/15 min among the males of the 3 groups, resp. Gastric acid secretion was also found to be higher in patients with low gastric ulcers than in those with high ulcers. Postoperatively, only one patient had an incomplete vagotomy as shown by response to insulin; the basal secretion was decreased to 0.1-0.5 mEq/15 min and the maximal secretory capacity was decreased by 72.6-80.8%. Follow-up at 6-18 months showed persistent gastric ulcer in the one patient with incomplete vagotomy and healing in the other 17, although one had a recurrence within 6 months. Successful treatment of gastric ulcers is concluded to be dependent upon a complete vagotomy, which ac achieves its effect by reducing both nervous and hormonal stimulation.

5230 FIELD DEPENDENCE IN ESSENTIAL HYPERTENSION AND PEPTIC ULCER. *(E.)*

Silverstone, S. (Dept. Psych., State U. New York, Brooklyn) and B. Kissin. *J Psychosom Res* 12(2):157-161, 1968.

Field dependence was evaluated by means of the embedded-figure test (EFT), a problem-solving perceptual test of field orientation requiring the subject to separate a geometric figure from an embedding context in which it is hidden, in 26 patients with essential hypertension, 29 patients with peptic ulcer, and 30 normal controls. All patients and controls were white males between the ages of 25 and 59. The mean EFT score was 903.92 for the hypertensives, 1126.80 for the controls, and 1313.55 for the ulcer patients. However, the variance within each group was so large that the only statistically significant difference ($p = 0.025$) was between the ulcer patients and the hypertensives. The mean index of social position, which is a function of intelligence and education, was identical for the 3 groups, and although the hypertensive group was slightly older, this correlates negatively with field independence. Although neither patient group was significantly different from controls, these findings suggest that hypertensive patients are less field dependent than peptic ulcer patients.

5231 LONG-TERM CLINICAL AND RADIOLOGICAL RESULTS FOLLOWING THE SURGICAL TREATMENT OF PERFORATED ULCERS. *(Ger.)*

Heinrich, P. (Surg. Clin., U. Rostock, Germany), M. Hille and R. Oschatz. *Zbl Chir* 93(37):1281-1295, 1968.

Among 505 patients treated for perforated peptic ulcers during a 22-yr period, 393 were initially treated by simple suture, 41 by a Neumann omental flap, and 16 by immediate resection; 103 of those treated by suture and 10 of those treated by a Neumann flap eventually also came to gastrectomy, due mostly to recurrent ulcer, stenosis or hemorrhage. The remaining 55 patients were treated conservatively (11), nto treated (4), or could not be evaluated (40). The overall mortality was 20%, including 63 of those treated by suture (16%), 18 of those treated by Neumann's method (44%), 1 of those given immediate resection (6.3%), and 13 of 15 treated conservatively or not at all; however, a Neumann flap was generally used in older patients and those presenting a greater operative risk. A total of 126 of these patients could be followed up; of these, 46 were free of symptoms (including 11 of 46 treated successfully by suture alone, 30 of 65 treated by suture plus later resection, and 5 of 15 treated by primary resection) and 11 had severe symptoms (5 treated by suture alone, 4 treated by suture plus gastrectomy, and 2 treated by primary resection). The types of symptoms encountered in each of these groups are analyzed in considerable detail. Since gastrectomy became necessary within 2 yr in 55.3% of all patients treated by suture, immediate resection is concluded to be the procedure of choice in perforated peptic ulcer.

5232 CLINICAL MANIFESTATIONS IN PATIENTS WITH CHRONIC ATROPHIC GASTRITIS, GASTRIC ULCER, AND DUODENAL ULCER. *(E.)*

Edwards, F. C. (West Middlesex Hosp., England) and N. F. Coghill. *Quart J Med* 37(146):337-360, 1968.

A comparative study of dyspepsia was made in 84 patients with chronic gastric ulcer, 119 patients with duodenal ulcer, and 221 patients with non-ulcer dyspepsia investigated by gastric biopsy. Each patient received a complete physical examination and was interviewed regarding history of symptoms, location, radiation and duration of pain, onset of pain in relation to meals, effect of alkalies, and the presence of nausea, vomiting, bleeding, headache, pain in the extremities as other symptoms. Gastric biopsy in the non-ulcer patients revealed a normal mucosa in 96, minor abnormalities in 70, chronic atrophic gastritis in 40, and chronic superficial gastritis in 15. The results indicated that a differential diagnosis between gastric and duodenal ulcer cannot be made, in most cases, without the use of X-ray. Clinical differences in these patients tended to be sharper between peptic ulcer and non-ulcer dyspepsia and, among the latter, between gastritis patients and patients with a normal mucosa, than between gastric and duodenal ulcer. It is concluded that chronic gastritis does not cause a specific type of dyspepsia, but that chronic gastritis may cause dyspeptic symptoms in some patients.

5233 CALCIUM METABOLISM IN PATIENTS WITH JEJUNAL ULCERS. *(Pol.)*

Sokolnicki, J. (2nd Surg. Clin., Acad. Med., Poznan, Poland) and R. Kwiatek. *Pol Tyg Lek* 23(20):749-751, 1968.

Among 20 patients (16 men and 4 women, 19-65 yr old, average 47) with recurrent jejunal ulcers following surgery for peptic ulcers of the stomach (4 cases) or duodenum (16 cases), 17 had hypercalcemia (5.8-6.5 mEq/liter), 10 had hyperphosphatemia (4.6-7.0 mg%), 13 had hyperphosphaturia (700-1500 mg/24 hr) and 8 had hypercalciuria (200-400 mg/24 hr). The only significant difference between 10 patients who had only had the initial ulcer operation 2-4 yr before and 10 somewhat older patients who had been treated successfully for the jejunal recurrence some 4-10 yr earlier was that the latter group accounted for 7 of the 8 patients with hypercalciuria. It is concluded that disturbances in calcium metabolism develop fairly early in patients with jejunal ulcers, but differ somewhat from the disturbances seen after partial gastrectomy. Possible causes of these disturbances include malabsorption and dietary peculiarities. Since most of these patients had normal or even increased gastric acidity, the effect of gastric acidity on calcium metabolism could not be verified.

5234 THE COAGULATING AND ANTICOAGULATING SYSTEMS OF THE BLOOD IN PATIENTS WITH PERFORATED GASTRODUODENAL ULCER. *(Rus.)*

Alimov, T. U. (Tashkent Med. Inst., USSR). *Vestn Khir Grekov* 100(5): 104-106, 1968.

5235 REPORT OF A CASE OF GASTRIC ULCER AND PHYTOBEZOAR IN A THIRTEEN-YEAR-OLD BOY. *(Sp.)*

Alfonso Ruiz, J. (Soc. Security Svc., Murcia, Spain). *Cir Ginec Urol* 21(4):484-488, 1968.

5236 GASTRIC ACID SECRETION FOLLOWING SURGERY FOR DUODENAL ULCERS. *(Sp.)*

Ribera, M. T. (Santa Cruz y San Pablo Hosp., Barcelona, Spain), L. Gramatica, M. Martinez-Brey and R. Hortas. *Cir Ginec Urol* 21(4):540-542, 1968.

5237 **THE DEFINITIVE TREATMENT FOR PERFORATED DUODENAL ULCERS.** *(Sp.)* De la Cruz Caro, F. (Fac. Med., U. Cadiz, Spain), F. Higuero Moreno and M. Pardo Martinez. *Cir Ginec Urol* 21(4):509-512, 1968.

5238 **DEFATTED MILK IN THE TREATMENT OF PEPTIC ULCERS.** *(Pol.)* Chorazy, W. (1st Clin. Int. Dis., Silesian Acad. Med., Katowice, Poland) and H. Sikora. *Wiad Lek* 21(9):739-742, 1968.

5239 **THE COMBINED USE OF HALIDOR AND GASTRIXON IN GASTRIC DISEASES.** *(Hun.)* Erczy, L. (Bajcsy-Zsilinszky Hosp., Budapest, Hungary) and F. Keveházi. *Magy Belorv Arch* 21(Suppl. 4):56-59, 1968.

5240 **EVALUATION OF PYLOROPLASTY AND VAGOTOMY IN THE SURGICAL MANAGEMENT OF PEPTIC ULCER.** *(E.)* Thoroughman, J. C. (VA Hosp., Atlanta, Ga.), L. G. Walker and C. M. Mann. *Southern Med J* 61(11):1227-1230, 1968.

5241 **NEEDLE-BIOPSY DATA ON THE MORPHOLOGICAL CHANGES IN THE LIVER AND PANCREAS DURING PEPTIC ULCER DISEASE.** *(Rus.)* Lobko, A. F. (Odessa Med. Inst., USSR). *Sovet Med* 31(8):10-14, 1968.

5242 **CIRCULATING PLASMA PROTEINS IN PATIENTS WITH STOMACH ULCERS.** *(Pol.)* Adamczyk, B. (2nd Surg. Clin., Acad. Med. Krakow, Poland), J. Kulpa and J. Spiechowicz. *Pol Przegl Chir* 40(7):782-787, 1968.

5243 **STUDIES ON THE URINARY EXCRETION OF 5-HYDROXYINDOLEACETIC ACID IN PATIENTS WITH GASTRIC OR DUODENAL ULCERS BEFORE, DURING AND AFTER TREATMENT WITH OXYPHENONIUM BROMIDE: CORRELATION WITH THE "BASAL SECRETION" OF HCl AND WITH THE CLINICAL CONDITION OF THE PATIENTS.** *(Pol.)* Czarnecki, J. (2nd Clin. Int. Dis., Acad. Med., Lublin, Poland). *Pol Arch Med Wewnet* 40(6):683-689, 1968.

5244 **THE CRITERIA FOR THERAPEUTIC ORIENTATION BASED ON CONSIDERATIONS IN 283 CASES OF PERFORATED GASTRIC AND DUODENAL ULCERS.** *(It.)* Zeri, G. (S. Giovanni Hosp., Rome, Italy), C. Fani and F. Puntillo. *Gazz Int Med Chir* 73(14):1232-1246, 1968.

5245 **PERFORATED GASTRODUODENAL ULCERS.** *(Sp.)* Valverde Acosta, O. (San Juan de Dios Hosp., San Jose, Costa Rica) and A. Carazo Gallegos. *Acta Med Costarricense* 11(1):17-37, 1968.

5246 **PRIMARY ULCER OF THE SMALL INTESTINE.** *(Ser.)* Kolmanić, P. (Cakovec Med. Ctr., Yugoslavia) and M. Kovačić. *Lijecn Vjesn* 90(3):253-256, 1968.

5247 **A COMPARATIVE STUDY OF THE WEIGHT GAIN FOLLOWING TWO-THIRDS GASTRECTOMY AND ANTRECTOMY COMBINED WITH VAGOTOMY.** *(Fr.)* Henrion, C. (Mons, Belgium) and P. Mainguet. *Acta Chir Belg* 67(4):343-356, 1968.

5248 **SOME PROBLEMS IN THE DIAGNOSIS AND TREATMENT OF GASTRODUODENAL ULCERS** *(Ser.)* Gašparov, A. (Army Inst. Gastroent., Belgrade, Yugoslavia). *Lijecn Vjesn* 90(4):297-309, 1968.

5249 **THE SURGICAL TREATMENT OF DIGESTIVE TRACT HEMORRHAGE DUE TO GASTRODUODENAL ULCER.** *(Sp.)* Vargas Molinare, R. (José Joaqui Aguirre Hosp., Santiago, Chile), J. Amat Vidal, R. Soumastre Chávez, J. Vargas Diaz, R. Vargas Diaz and H. Meriño. *Hosp Vina del Mar* 23(1/2):34-41, 1967.

5250 **ELECTROCARDIOGRAPHIC CHANGES IN PATIENTS WITH GASTRIC OR DUODENAL ULCERS.** *(It.)* D'Anelli, A. (Munic. Hosp., Asti, Italy), N. Proscia and F. Sorisio. *Arch Sci Med* 125(2):60-63, 1968.

5251 **CONTINUOUS ASPIRATION BY THE METHOD OF TAYLOR FOR GASTRODUODENAL ULCE PERFORATING INTO THE GENERAL PERITONEAL CAVITY.** *(Fr.)* Fontaine, R. (Munic. Hosp., Strasbourg, France), S. Babin, J. Nety and G. Barth. *Ann Chir* 22(5/6):343-347, 1968.

5252 **FAMILIAL PREDISPOSITION TO PEPTIC ULCERS.** *(Rus.)* Tsimmerman, Ia. S. (Perm Med. Inst., USSR) and M. A. Zektser. *Klin Med (Moskva)* 46(7):77-80, 1968.

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5254 **BLOOD CHOLESTEROL LEVELS AND GASTRODUODENAL ULCERS.** *(Por.)* Siffert Junior, G. (Gen. Polyclin., Rio de Janeiro, Brazil) and M. F. Gomes Jardim. *Folha Med* 57(1):43-46, 1968.

5255 **SECONDARY OPERATIONS FOR RECURREN PEPTIC ULCER FOLLOWING GASTROENTEROSTOMY OR PARTIAL GASTRECTOMY IN PATIENTS WITH PEPTIC ULCER DISEASE.** *(Pol.)* Dowgird, A. (J. Sniadecki Milit. Hosp., Bialystok, Poland), Z. Korfel and K. Kanigowski. *Pol Prezgl Chir* 40(7):774-781, 1968.

5256 **MASSIVE GASTRIC HEMORRHAGE IN LATE PREGNANCY: SURVIVAL OF MOTHER AN OFFSPRING AFTER VAGOTOMY AND PYLOROPLASTY.** *(E.)* Grosfeld, J. L. (US Army Hosp., Fort Jackson, S. Carolina). *Ann Surg* 168(6):971-973, 1968.

5257 **SELECTIVE ANTERIOR AND TOTAL POSTERIOR VAGOTOMY COMPARED WITH BILATERAL SELECTIVE VAGOTOMY IN TREATMENT O DUODENAL ULCER IN 116 PATIENTS.** *(E.)* Marckmann,

A. (Bispebjerg Hosp., Copenhagen, Denmark), H. Baden and E. Amdrup. *Scand J Gastroent* 3(4):439-443, 1968.

5258 SELECTIVE GASTRIC VAGOTOMY. *(E.)* Legros, G. (U. Washington Sch. Med., Seattle) and C. A. Griffith. *Canad J Surg* 11(4):435-443, 1968.

5259 PERFORATED GASTRIC AND DUODENAL ULCERS. *(Pol.)* Banaszkiewicz, Z. (L. Rydygier Hosp., Czestochowa, Poland). *Wiad Lek* 21(16):1397-1400, 1968.

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5269 TREATING ULCER DISEASE WITH CARBENOXOLONE SODIUM. *(E.)* Watkinson, G. (York Hosp., England). *Postgrad Med* 44(5):92-98, 1968.

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5277 **THE PROBLEM OF SEGMENTAL ILEITIS (CROHN'S DISEASE).** *(Rus.)* Moroz, I. M. (Lvov Med. Inst., USSR) and F. A. Spektor. *Klin Med (Moskva)* 46(7):102-106, 1968.

5278 **CROHN'S DISEASE OF THE COLON: A REPORT OF THREE CASES.** *(Fr.)* Hirsch, F. (Schaerbeek Hosp., Brussels, Belgium), M. de Schreyer, A. Dony, C. de Witte and A. Leempoel. *Acta Gastroent Belg* 31(7):502-516, 1968.

5279 **REGIONAL ENTERITIS: DIFFERENTIAL DIAGNOSIS AND SURGICAL TECHNIQUES.** *(Ger.)* Buse, H. (Surg. Clin., U. Göttingen, Germany) and H. Emmermann. *Chirurg* 39(10):452-456, 1968.

5280 **REGIONAL ENTERITIS.** *(Ger.)* Kümmerle, F. (Surg. Clin., U. Mainz, Germany) and J. Schier. *Chirurg* 39(10):437-442, 1968.

5281 **CROHN'S DISEASE AND DIFFUSE SYMMETRICA PERIOSTITIS.** *(E.)* Neale, G. (Royal Postgrad. Med. Sch., London, England), A. R. Kelsall and F. H. Doyle. *Gut* 9(4):383-387, 1968.

5282 **CROHN'S DISEASE: NATURAL HISTORY AND TREATMENT.** *(E.)* Lennard-Jones, J. E. (St. Mark's Hosp., London). *Postgrad Med J* 44(515):674-678, 1968.

5283 **THE CHRONIC FORM OF REGIONAL ILEITIS–CROHN'S DISEASE.** *(Ser.)* Ivanišević, B. (Med. Fac., U. Zagreb, Yugoslavia) and V. Hartl-Prpić. *Lijecn Vjesn* 90(4):319-323, 1968.

5284 DEFICIENCY OF γM-GLOBULIN IN COELIAC DISEASE. *(E.)* Hobbs, J. R. (Royal Postgrad. Med. Sch., London, England) and G. W. Hepner. *Lancet* 1(7536):217-220, 1968.

Serum-immunoglobulin determinations were made in 75 adults and 5 children with celiac disease, as well as in 18 patients with steatorrhea due to other causes, including 7 with Crohn's disease, 4 with pancreatic insufficiency, 2 with chronic biliary obstruction, 2 with tropical sprue, and 3 with blind-loop syndrome. The diagnosis of celiac disease was established by finding subtotal villous atrophy in a jejunal biopsy specimen. Of these 80 patients, 31 were taking a gluten-free diet; a gluten-free diet was prescribed in an additional 18 patients after the initial observations of serum immunoglobulins were made, while 26 patients remained untreated by gluten-free diet. Immunoglobulins were measured by a modified Mancini method. In 27 of 44 patients with untreated celiac disease γG and γA were largely in the normal range but γM deficiency was present in 27 (61%). Among 18 patients having γM deficiency before beginning a gluten-free diet, 16 showed a rise in γM levels after treatment with gluten-free diet. When gluten was reintroduced into the diet of 8 patients in whom γM levels had returned to normal, the γM level was noted to fall. Two patients had isolated γA deficiency which was unaffected by taking a gluten-free diet. Two patients had deficiencies of all 3 immunoglobulins. Subnormal γM levels, found in all 5 children with celiac disease, returned to normal in 3 with a gluten-free diet. The immunoglobulin levels were normal in 17 of the 18 patients with steatorrhea due to other causes. No examples of nodular lymphoid hyperplasia were found. It is concluded that γM deficiency is most frequent in patients with untreated celiac disease, with levels returning to normal in most patients after institution of a gluten-free diet.

5285 MORPHOLOGIC ALTERATIONS ASSOCIATED WITH NEOMYCIN INDUCED MALABSORPTION. *(E.)* Dobbins, W. O. III. (VA Hosp., Durham, N. C.), B. A. Herrero and C. M.Mansbach. *Amer J Med Sci* 255(1): 63-77, 1968.

In 3 adult volunteers without significant gastrointestinal disease, small-intestinal biopsies and determinations of the serum cholesterol and carotene levels and the 48-hr urinary excretion of ^{60}Co-labeled vitamin B_{12} were performed before and after the oral administration of neomycin (1.5 g q.i.d. for 4-8 days). Following neomycin treatment, biopsies were taken before and after intraduodenal administration of 100 cc corn oil emulsified in 200 cc water. Neomycin treatment produced significant decreases in serum carotene and cholesterol levels and in urinary vitamin B_{12} excretion in all 3 cases, along with steatorrhea in the 2 patients from whom stools were collected. Light microscopy revealed shortening of the villi and infiltration of the lamina propria by plasma cells, occasional polymorphonuclear leukocytes and eosinophils, and pigment-containing macrophages. There were no significant abnormalities in the absorptive cells, but crypt cells in mitosis were unusually common suggesting partial mitotic arrest. Electron microscopy revealed large heterogeneous lysosomal structures referred to as heterophagic vacuoles in the infiltrating macrophages, and approximately 50% of the intestinal crypt cells showed evidence of injury. In one of the 3 cases, the intestinal biopsy taken after intraduodenal administration of corn oil showed a striking accumulation of lipid within the intestinal absorptive cells at the tips of the villi. It is concluded that neomycin probably has an adverse effect on multiple enzyme systems, both intra- and extracellular, and that neomycin-induced malabsorption is not the best model for the study of malabsorption in man.

5286 FURTHER INVESTIGATIONS IN THE METHIONINE MALABSORPTION SYNDROME. *(E.)* Hooft, C. (Pediat. Clin., State U., Ghent, Belgium), D. Carton, J. Snoeck, J. Timmermans, I. Antener, C. van den Hende and W. Oyaert. *Helv Paediat Acta* 23(4):334-349, 1968.

The clinical and biochemical condition of a previously reported girl with a methionine malabsorption syndrome was reevaluated at the age of 6 yr, 2.5 yr after the start of dietary methionine restriction. The clinical symptoms of diarrhea, convulsions, and peculiar smell had subsided, although the child remained mentally very retarded. A methionine loading test resulted, to some degree, in the same biochemical pecularities seen in the full-blown disease: urinary excretion of α-hydroxybutyric acid, an increase in stool weight, an increased excretion of α-hydroxyacids, and the appearance of α-hydroxybutyric acid in the stools. The only biochemical abnormality found in the parents and 10 of the 11 siblings of the girl with methionine malabsorption were an increased fecal excretion of α-aminobutyric acid in 2 cases, the presence of discrete amounts of α-hydroxybutyric acid in the feces of 1 boy, and a slight pathological ketoaciduria in most cases. After methionine loading, both parents and 3 siblings excreted α-hydroxybutyric acid in the urine and/or stools. The data point to the genetic character of this disease, the pattern of inheritance being consistent with an autosomal recessive trait.

5287 ABSORPTION OF CRYSTALLINE FOLIC ACID IN MAN. *(E.)* Hepner, G. W. (Royal Postgrad. Med. Sch., London, England), C. C. Booth, J. Cowan, A. V. Hoffbrand and D. L. Mollin. *Lancet* 2(7563):303-306, 1968.

The mechanism and site of the absorption of crystalline folic acid were studied in 24 controls, 8 patients with celiac disease, and one patient with obstructive jaundice due to carcinoma of the head of the pancreas, using a double-lumen perfusion technique. In controls, absorption took place principally in the upper jejunum, and decreased from 55.3% to 22.7% as the concentration of the perfusing folic acid solution was increased from 100 to 10,000 ng/ml. Absorption in the distal jejunum was poor and there was no folic acid absorption in the distal ileum. In patients with celiac disease, absorption in the upper jejunum was markedly impaired, ranging from 3.5% at 10 ng/ml to 21.6% at 100 ng/ml and again decreasing with increasing concentration (to 8.9% at 10,000 ng/ml). In the distal jejunum, however, absorption was similar to that in controls. In the patient with obstructive jaundice, absorption of folic acid from a 10 ng/ml solution in the upper jejunum was still 34-36% after i.v. injection of sufficient folic acid to raise the serum level to 300 ng/ml. This absorption against a 30-fold concentration gradient, along with the decreasing absorption at higher concentrations, indicates that folic acid absorption is an active process.

5288 **LYSINE ABSORPTION IN THE SMALL INTESTINE. THE RELEVANCE OF FAECAL CADAVERINE AS AN INDEX OF LYSINE MALABSORPTION.** *(E.)* Abraham, A. (Green Lane Hosp., Auckland, New Zealand), Z. Radonich, and C. T. Jones. *Clin Chim Acta* 22(4):619-623, 1968.

The intestinal absorption of lysine after an oral dose of 10 g was studied in 13 normal subjects, 7 patients with hereditary pancreatitis, and 1 with cystinuria. Stools were collected before and after lysine administration and Cadaverine, one of the bacterial metabolites of lysine, was determined by high-voltage electrophoresis. The total amount of heterocyclic amines excreted in 24-hr urine samples before and after lysine administration was also determined. In 2 of the normal subjects, cadaverine was present before lysine loading and in 3 a considerable excretion of cadaverine was noted after the lysine load. In 2 of the patients with hereditary pancreatitis and in the patient with cystinuria, cadaverine was present both before and after lysine administration. There was no direct correlation between the presence of cadaverine and the amount of heterocyclic amines excreted. It is concluded that measurements of fecal cadaverine and urinary heterocyclic amines are not reliable indices of lysine malabsorption.

5289 **INTERRELATIONSHIP OF MAGNESIUM AND IONIZED CALCIUM IN HUMAN MAGNESIUM DEFICIENCY.** *(E.)* Zimmet, P. (Alfred Hosp., Melbourne, Australia). *Med J Aust* 2(12):496-500, 1968.

Plasma ionized calcium levels were measured in 4 patients (2 males and 2 females, 34-69 yr old) with magnesium deficiency before and after an i.v. infusion of magnesium (40-100 mEq in 2 hr). The 2 male patients had adult celiac disease, 1 woman had intestinal lymphangiectasis, 1 women had post-thyroidectomy hypoparathyroidism, and all but 1 (who had radiological evidence of metabolic bone disease) had tetany which disappeared when the initially low calcium levels were raised by infusion of Mg. The mechanism of this interaction is unknown, but it is suggested that magnesium deficiency inhibits release of ionized calcium from the exchangeable bone pool or intracellular sites. The tetany seems to be a consequence of low plasma ionized calcium levels, and the rise in these levels during magnesium infusion explains why magnesium therapy will relieve tetany in these patients.

5290 **GLUTEN ANTIBODIES AND TROPICAL SPRUE.** *(E.)* Menéndez-Corrada, R. (VA Hosp., San Juan, Puerto Rico) and M. E. Belaval. *Amer J Dig Dis* 13(11):987-993, 1968.

Macro- and microimmuno-diffusion techniques with gliadin as the antigen, were utilized to study the incidence of circulating antibodies against cereal protein in 30 male patients with tropical sprue and a control group of 36 patients (33 men and 3 women) with chronic diarrhea from other causes. Although gluten antibodies are frequently found in the serum of patients with celiac disease, these antibodies were absent from the patients suffering from tropical sprue. In the entire group of 66 patients, clearcut precipitin reactions against gliadin and/or milk were obtained in only 2 (both with pernicious anemia), but faintly positive reactions were more common in the control group than among the patients with tropical sprue. It is suggested that the difference in antibody response in tropical and nontropical sprue may be related to the dissimilarity between the two diseases in the patterns of intestinal involvement. The circulating antibodies may be an expression of inadequate digestion above and preserved ileal function below the injured mucosa.

5291 **ZINC TREATMENT IN MALABSORPTION.** *(E.)* MacMahon, R. A. (Queen Victoria Mem. Hosp., Melbourne, Australia), M. L. Parker and M. C. McKinnon. *Med J Aust* 2(5):210-212, 1968.

Two cases of malabsorption are described in which a zinc deficiency was diagnosed by the use of atomic absorption spectrophotometry. The first patient was a 71-yr-old woman, the second a 7-month-old male. Both showed biochemical and one showed clinical evidence of zinc deficiency, due apparently to intestinal malabsorption resulting from celiac disease and congenital megacolon, resp. After surgery, dietetic therapy and oral zinc sulfate (10-100 mg t.i.d.), they both showed marked clinical improvement coincident with an increase in zinc blood levels. The specific effect of zinc on the clinical picture could not be differentiated, however, from the general improvement associated with the increased absorption of a protein- and vitamin-rich diet.

5292 **EXPERIMENTAL STUDIES ON THE MALABSORPTION SYNDROME INDUCED BY NEOMYCIN.** *(Pol.)* Ksiazkiewicz-Szapiro, M. D. (Inst. Postgrad. Med., Acad. Med., Warsaw, Poland), Z. Lewicki and M. Beskid. *Pol Arch Med Wewnet* 40(6):691-699, 1968.

5293 **INTESTINAL DISEASES ACCOMPANIED BY CARBOHYDRATE MALABSORPTION.** *(Por.)* Salazar de Sousa, C. (Portuguese Pediat. Soc., Lisbon, Portugal). *Rev Port Pediat* 30(12):346-360, 1967.

5294 **THE SEGMENTAL INNERVATION OF THE INTESTINAL MUCOSA IN DIABETIC STEATORRHEA.** *(It.)* Dal Monte, P. R. (Inst. Spec. Med. Path., U. Bologna, Italy), C. Giro and L. Lodi. *Endocr Sci Cost* 29(3):204-210, 1968.

5295 **HETEROGENEITY OF ENZYMES OF SMALL-INTESTINAL MUCOSA IN MALABSORPTION SYNDROME.** *(E.)* Frič, P. (2nd Res. Unit Gastroent., Prague, Czechoslovakia), Z. Lojda and J. Jodl. *Cesk Gastroent Vyz* 22(4):235-249, 1968.

5296 **MEDIUM-CHAIN TRIGLYCERIDES.** *(Rev.)(E.)* Harkins, R. W. (AMA Dept. Foods & Nutrit., Chicago, Ill.) and H. P. Sarett. *JAMA* 203(4):272-274, 1968.

5297 **HYPERAMYLASEMIA FROM THE BINDING OF SERUM AMYLASE BY AN 11S IgA GLOBULIN. [CASE REPORT].** *(E.)* Levitt, M. D. (Boston U. Sch. Med., Mass.) and S. R. Cooperband. *New Eng J Med* 278(9):474-479, 1968.

5298 THE DETECTION OF DISTURBANCES IN INTESTINAL ABSORPTION (WITH PARTICULAR ATTENTION TO THE USE OF FECES ANALYSIS IN GASTROINTESTINAL SYNDROMES). *(Ger.)* Erb, W. (1st Med. Clin., U. Frankfurt/Main, Germany) and E. Böhle. *Z Gastroent* 6(4):241-250, 1968.

5299 ANTIBODIES TO GLIADIN IN CHILDREN WITH CELIAC DISEASE. *(Pol.)* Zareba, J. (Pediat. Dis. Clin., Silesian Acad. Med., Zabrze, Poland). *Pol Tyg Lek* 23(48):1844-1846, 1968.

5300 FATE OF ^{131}I-PHENYLSTEARIC ACID AND ^{131}I-OLEIC ACID AFTER INTRAVENOUS AND ORAL ADMINISTRATION. *(E.)* Anghileri, L. J. (Inst. Nucl. Med., Heidelberg, Germany). *Nuclearmedizin* 7(2):173-183, 1968.

5301 VITAMINS AND ALCOHOLISM. *(E.)* Leevy, C. M. (New Jersey Coll. Med., Jersey City) and H. Baker. *Amer J Clin Nutr* 21(11):1325-1328, 1968.

5302 IMPAIRMENT OF THIAMINE ABSORPTION IN ALCOHOLISM. *(E.)* Tomasulo, P. A. (Johns Hopkins Hosp., Baltimore, Md.), M. H. Kater and F. L. Iber. *Amer J Clin Nutr* 21(11):1341-1344, 1968.

5303 INVESTIGATION OF STEATORRHOEA. *(E.)* Goulston, K. (Royal Prince Alfred Hosp., Sydney, Australia) and K. Bhanthumnavin. *Med J Aust* 2(11):462-466, 1968.

5304 THE LYMPHATIC SYSTEM IN EXUDATIVE ENTEROPATHY. *(Ger.)* Ritter, U. (Med. Acad., Lübeck, Germany). *Aktuel Gastroent* pp. 49-52. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5305 CLINICAL AND QUANTITATIVE HISTOLOGICAL STUDIES ON THE OSTEOMALACIAS ACCOMPANYING THE MALABSORPTION SYNDROME. *(Ger.)* Vittali, H. P. (2nd Med. Clin., U. Munich, Germany), M. Dambacher and P. Bottermann. *Aktuel Gastroent* pp. 197-200. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5306 THE OCCURRENCE OF OSTEOMALACIA IN SPRUE WITHOUT STEATORRHEA. *(Ger.)* Hunstein W. (Med. Clin. Polyclin., U. Göttingen, Germany), K. Sickinger and W. Creutzfeldt. *Aktuel Gastroent* pp. 200-202. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5307 FAMILIAL HYPOPARATHYROIDISM WITH A DISTURBANCE IN THE RENAL REABSORPTION OF CYSTINE. *(Ger.)* Brodehl, J. (Pediat. Clin., U. Bonn, Germany), K. Gellissen and S. Kowalewski. *Aktuel Gastroent* pp. 203-205. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5308 THE USE OF A MEDIUM CHAIN TRIGYLCERIDE DIET IN CHYLOPERITONEUM. *(E.)* Gracey, M. (General Hosp., Port Moresby, New Guinea), and P. M. Gooch. *Aust Paediat J* 4(1):66-68, 1968.

5309 MALABSORPTION SYNDROME IN PAGET'S DISEASE OF BONE. *(E.)* Somayaji, B. N. (Dudley Road Hosp., Birmingham, Ala.). *Brit Med J* 4(5626): 278-280, 1968.

See also abstract nos.: 4714,4729,4730,4854,5145,5361,5386

5310 THE PROGNOSIS AND MORTALITY IN CARCINOMA OF THE RIGHT HALF OF THE COLON. *(Turk.)* Yaycioglu, A. (Med. Fac., Ankara U., Turkey), M. Onat and O. Ozbal. *Tip Fak Mec* 21(1):148-154, 1968.

During the period 1960-66, 19 patients (16 men and 3 women, 23-84 yr old, most between the ages of 50 and 60) with carcinoma of the right colon were admitted to the First Surgical Clinic of Ankara University, representing 45% of all patients with colon cancer and 16.8% of all patients with cancer of the large intestine (including the anus and rectum). The duration of symptoms was about 1 yr in all cases, and none were found to have precancerous lesions. Three of the 19 patients were found to be inoperable, and the remainder received hemicolectomy. In all cases, pathological examination revealed mucoid or papillary adenocarcinoma, and 7 of the 16 operated cases had involvement of the local lymph nodes. The mortality rate was 6.2%, and 8 of the 16 patients remained asymptomatic for 3-8 yr postoperatively. It is concluded that the absence of precancerous lesions such as ulcerative colitis and reduced lymphatic drainage from the right colon are important factors in dedetermining the prognosis of cancer at this site.

5311 SOME ASPECTS OF THE SURGERY OF THE LEFT COLON. *(Rus.)* Belkaniia, S. P. (N. I. Pirogov Med. Inst., Vinnitsa, USSR). *Vestn Khir Grekov* 100(5):50-55, 1968.

An analysis of the results of 220 operations on the left colon, including 168 cases treated by radical surgery and, among these, 139 single-stage sigmoidectomies, confirmed the definite superiority of end-to-end anastomoses and double-row suturing. These patients were treated for acute volvulus, megacolon, cancer of the sigmoid, ileus and other conditions; 190 of the 220 patients survived, most of the deaths being due to acute volvulus or inoperable cancer. Cures were obtained in all but 11 of the survivors. Among the 168 patients treated by resection, 13 died, including 6 of the 124 given end-to-end anastomoses, 7 of the 36 given side-to-side anastomoses, and none of 8 given end-to-side anastomoses. The principal complications were abdominal wall or intraperitoneal infiltration, peritonitis, fistulas and suture-breakdown, and it is suggested that the blind loops created by side-to-side anastomosis are responsible for many of these developments. The technique of sigmoidectomy for megacolon is described in some detail, and it is recommended that neomycin and/or colimycin be used in the preoperative preparation and postoperative supportive care.

5312 THE TREATMENT OF RECTAL FISTULAS. *(Rus.)* Ryzhikh, A. N. (Sci.-Res. Lab. Proctol., Min. Health RSFSR, Moscow, USSR) and L. U. Nazarov. *Khirurgiia (Moskva)* 44(2):109-115, 1968.

Contrary to the experience at some other clinics, cures have been obtained in about 96% of the 4603 patients operated on by the authors for rectal fistulas during the period 1949-66. Pararectal fistulas accounted for about 35% of all proctological patients seen, and only 4.2% of these fistulas lacked an external opening, the other 95.8% being complete. Cures were obtained in 99.2% of 1667 patients treated by Gabriel's operation for low (intrasphincteric) fistulas, in 97.7% of 1322 patients treated for transsphincteric fistulas by resection of the s.c. wound with knotted catgut sutures, in 93.6% of 1267 patients treated by A. N. Ryzhikh's 1st operation for complex high fistulas, and in 94.9% of 226 patients treated by A. N. Ryzhikh's 2nd operation for complex high fistulas. The two techniques for surgery on high complex fistulas are described in detail. Experience shows that excision of the fistula plus resection of the sphincter via the internal opening of the fistula, with careful rectal tamponade, need not impede sphincteric function. Relatively prolonged postoperative loss of anal control was seen in only 54 cases, most of whom had been operated on several times before, without success, over periods of 6-7 years.

5313 TOTAL SALVAGE IN ADENOCARCINOMA OF THE RECTUM AND RECTOSIGMOID. *(E.)* Reynolds, C. T. (Pondville Hosp., Walpole, Mass.), C. E. LaCoste, W. P. Rogers Jr. and M. Yatsuhashi. *Surg Gynec Obstet* 127(5):975-980, 1968.

An outline of the results in 259 patients treated for cancer of the pelvic colon, below 15 cm from the anus, during the period 1947-56 is presented, indicating the results to be expected from the entire group and from separate categories of primary, secondary, curable and incurable lesions. Of 211 patients with primary or previously untreated lesions, 121 (57%) were resectable for cure. The 5-yr survival rate of the patients with negative nodes undergoing abdominoperineal resection for cure was 60%, while patients with positive nodes had a 30% 5-yr survival rate. Sixty-one patients in the primary group were treated palliatively by various procedures. Of the 46 patients surviving the surgical procedure, 22 were alive after 12 months. In 29 patients the tumor was classed as indeterminate. Of 48 patients with secondary tumors (previous therapy elsewhere), 10 received effective treatment for active disease, 8 received radiation for pelvic recurrence (7 died within 15 months), and 2 underwent surgical procedures (1 died at 2 yr; 1 was alive at 10 yr). The mortality of curative procedures rose sharply in the oldest age groups, and still more sharply for palliative procedures. The high mortality above 80 yr of age precludes any but the simplest procedure. The general outlook for cancer of the rectum and rectosigmoid is far more grim than the current literature would suggest.

5314 CARCINOID TUMORS OF THE RECTUM: A REVIEW OF 40 CASES. *(E.)* Tumacder, O. C. (Grace Hosp., Detroit, Mich.), R. C. Horn Jr., B. Eisenstein, T. C. Arminski, G. S. Wilson and R. J. Lucas. *Arch Surg* 97(2):261-266, 1968.

A series of 40 patients (16 men and 24 women, 31-80 yr old but most in the 5th decade) with carcinoid tumors of the rectum is presented. Thirty-two of the 39 tumors which measured 1 cm or less in diameter were treated by local excision; the remaining 7 patients in this group underwent more extensive surgical procedures (transsacral wedge resection, anterior resection, or abdominoperineal resection). The lesions treated by local excision could not be distinguished clinically or histologically from those treated by more radical procedures. The 1 patient with a large carcinoid tumor (2.5 cm) had extensive metastasis at the time of discovery of the primary lesion; this patient underwent a palliative anterior resection but died 12 months later of liver failure, representing the only death in the group. Adequate late follow-up was obtained in 37 of the 40 patients, and all have remained asymptomatic with no known recurrent lesions. This series confirms the opinion that small rectal carcinoids tend to behave clinically as benign lesions and should be treated by simple local excision. Radical surgery should be reserved for patients with primary tumors over 2.0 cm in diameter, local recurrence, or definite invasion beyond the primary tumor.

5315 **THREE CASES OF ISCHAEMIC COLITIS.** *(E.)* Dickson, G. H. (West Middlesex Hosp., Isleworth, England). *Gut* 9(4):376-380, 1968.

Detailed radiological and pathological findings are presented for 3 cases of ischemic colitis. A 77-yr-old woman had gangrenous ischemic colitis of the transverse colon, which appeared to be ude to primary venous thrombosis. The patient underwent surgery but died on the 9th postoperative day. A 92-yr-old woman probably represented a case of ischemic stricture showing complete spontaneous resolution. The most important feature of this case was the probable recovery of the colon without specific treatment. The area of the colon involved was similar to the diseased areas in the first patient. A 75-yr-old man was diagnosed as having a condition lying somewhere between ulcerative colitis and ischemic colitis. The disease symptoms improved with therapy but the patient died of ventricular failure.

5316 **ELECTRONIC CONTROL OF FECAL INCONTINENCE.** *(Dan.)* Ebskov, B. (Bispebjerg Hosp., Copenhagen, Denmark). *Nord Med* 80(40):1323-1325, 1968.

A device is described for the continuous electrical stimulation of the anal sphincter in patients with fecal incontinence. Concentric stainless-steel electrodes mounted on an acrylic plug are inserted into the anus and connected to a multivibrator which generates 1-millisecond pulses at 40 cycles/second (0-6 volts). Worn with a belt around the waist, the stimulator weighs 140 g and measures 65x55x22 mm. Successful use of the device for a period of 5 months by a 69-yr-old woman who developed fecal incontinence after surgery for anal fistula is reported.

5317 **PERFORATION OF THE BOWEL IN THE NEWBORN AS A COMPLICATION OF EXCHANGE TRANSFUSION.** *(E.)* Orme, R. L'E. (North Devon Infirm, Barnstaple, England) and S. M. Eades. *Brit Med J* 4(5627):349-351, 1968.

Spontaneous perforation of the bowel without evidence of intestinal obstruction is reported in 6 infants who had received exchange transfusions shortly before, and in 1 patient who had received fluids via the umbilical vein. Clinical manifestations were divided into 2 groups: early and late. Early signs included refusal to feed, rectal passage of blood and mucus, abdominal distension, bilious vomiting, and absent bowel sounds. Late signs, after perforation had occurred, included erythema and edema of the anterior umbilical wall, grunting, pallor, hypothermia, and peripheral circulatory failure. The pathological findings resembled those found in acute necrotizing enterocolitis in adults: diffuse nonspecific areas of necrosis with acute inflammation. A period of arterial hypotension during the transfusion, along with hypoxia and superimposed infection, is thought to be the cause of these lesions and subsequent perforation.

5318 **COLONIC PERFORATION AFTER EXCHANGE TRANSFUSION.** *(E.)* Corkery, J. J. (Children's Hosp., Sheffield, England), V. Dubowitz, J. Lister and A. Moosa. *Brit Med J* 4(5627):345-349, 1968.

Four infants are presented in whom perforation of the colon followed exchange transfusion for hemolytic disease of the newborn. In 2 patients, perforation occurred after the 1st, in 1 patient after the 2nd, and in 1 patient after the 3rd transfusion. In 3 patients, the 1st abnormal sign was the passage of blood per rectum 4-15 hr after exchange, followed within 24 hr by general nonspecific deterioration: lethargy, poor peripheral circulation, abdominal distension and vomiting. The diagnosis was confirmed by X-ray. The histological appearance of the damaged bowel was similar in the 3 cases studied, showing necrosis progressing from the epithelium to full-thickness loss, and areas of mild inflammatory reaction at the edges of the affected areas. All patients were treated by laparotomy and broad-spectrum antibiotics, and all eventually recovered. Perforation may have been due to a vascular accident occurring as a mechanical result of the exchange transfusion.

5319 **MANAGEMENT OF VILLOUS ADENOMAS OF THE COLON AND RECTUM.** *(E.)* Nicoloff, D. M. (Minneapolis VA Hosp., Minn.), C. M. Ellis and E. W. Humphrey. *Arch Surg* 97(2):254-260, 1968.

A review of the charts of 1297 patients with polyps and carcinomas of the colon and rectum revealed 55 cases with villous adenoma, an incidence of 4%. Villous adenomas were located primarily in the rectosigmoid area of older patients (average age 65 yr). The most common presenting complaint was rectal bleeding but 21.8% had no symptoms. Malignancy occured in 36% of these tumors and 61.7% were associated with simultaneous colonic lesions. The size of the villous adenomas ranged from 0.5 cm to greater than 11 cm with complete encirclement of the bowel, and the larger lesions had a higher incidence of malignancy. It is suggested that surgical treatment be individualized for each patient, with the histological picture, site, and physical fitness of the patient guiding the surgeon as to whether a radical or conservative procedure should be used.

5320 **APPENDICITIS IN THE MALE VETERAN: A FIVE YEAR REVIEW.** *(E.)* Dieter, R. A. Jr. (Hines VA Hosp., Ill.). *Milit Med* 133(10):804-810, 1968.

The case histories of 91 male veterans (average age 51 yr but including 42 older than 50) treated for acute appendicitis during a 5-yr period were reviewed with regard to age, preoperative, operative, and postoperative diagnoses, admission symptoms, X-ray and laboratory findings, time intervals from admission to treatment, surgical procedures and postoperative complications. Presenting symptoms included a typical radiating or right lower quadrant pain in 56 cases, diffuse abdominal pain in 20, nausea, vomiting, anorexia and fever in most, and leukocytosis in 74 cases. The time from first symptoms to hospital admission or medical care was one day or less in 32 cases, 25-72 hr in 31, and longer (up to 5 months) in 28. A preoperative diagnosis of appendicitis was made in 71 cases, but there were a total of 129 concomitant diseases, due probably to the relatively advanced age of the patient group. Perforation was found at surgery in 45 cases (including 23 with cecal perforation), and frank peritonitis was found in 12. There were 9 deaths, including 8 in patients over 65 yr of age. Immediate postoperative complications included wound infection (31 cases), wound dehiscence (8 cases, 7 in patients over 68 yr of age and 2 fatal), gastrointestinal complications such as fistulas, stress ulcers, ileus and enterocolitis (23 cases), and pulmonary or cardiovascular complications (12 cases); these affected 59 of the 91 patients. Antibiotics were used in 15 patients preoperatively, to a total of 80 patients. The relatively high mortality and complication rate is ascribed to the poor condition of many of these patients on admission.

5321 HIGH CATHETERIZATION VIA THE RECTUM DURING SURGERY FOR INTESTINAL OBSTRUCTION. *(Rus.)* Bagirov, D. M. (Kubinskaia Distr. Hosp., USSR). *Khirurgiia (Moskva)* 44(2):119-120, 1968.

5322 THE RESECTION OF PARARECTAL FISTULAS USING A BLIND SUTURE. *(Rus.)* Zhardetskii, A. S. (United Hosp., Odessa-Kishinev Railroad) and V. I. Selivanov. *Khirurgiia (Moskva)* 44(2):115-118, 1968.

5323 REPORT OF TWO RARE CASES OF INTESTINO-APPENDICULAR INVAGINATION IN THE ADULT. [TWO CASES] *(Sp.)* Barreiro Alvarez, F. (La Paz Soc. Security Svc. Hosp., Madrid, Spain), F. Vazquez Rodriguez and J. Rodriguez Alvarez. *Rev Esp Enferm Apar Dig* 27(5):761-784, 1968.

5324 THE AMMONIA LEVEL IN VENOUS BLOOD IN MEGACOLON. *(Ger.)* Bennek, J. (Pediat. Surg. Clin., Karl-Marx U., Leipzig, Germany) and M. Hofmann. *Z Kinderchir* 6(2):199-205, 1968.

5325 ADDITIONAL EXPERIENCE WITH INTERNAL SPHINCTEROTOMY BY THE METHOD OF EISENHAMMER FOR ANAL FISSURES, FISTULAS AND HEMORRHOIDS. *(Ger.)* Hochuli, R. (Surg. Clin., U. Basel, Switzerland) and M. Allgower. *Helv Chir Acta* 35(1/2):266-271, 1968.

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5327 PALLIATIVE AMPUTATION OF THE RECTUM FOR ADVANCED CANCER. *(Fr.)* Pettavel, J. (Surg. Clin., U. Lausanne, Switzerland), F. Saegesser and S. Vecerina. *Helv Chir Acta* 35(1/2):235-238, 1968.

5328 COBALT THERAPY IN THE TREATMENT OF ANAL CANCER. *(Fr.)* Rousseau, J. (Curie Found Found., Paris, France), P. Debertrand and G. Mathieu. *Acta Gastroent Belg* 31(3):191-210, 1968.

5329 THE ROLE OF RADIATION IN THE CONSERVATIVE TREATMENT OF LIMITED CANCERS OF THE RECTUM AND ANUS. *(Fr.)* Papillon, J. (Dept. Radiol., Fac. Med., Lyon, France). *Acta Gastroent Belg* 31(3):211-227, 1968.

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5332 HISTOCHEMISTRY OF THE MUCUS SECRETED BY A HUMAN COLONIC TUMOR (TUMOR Z 516) FOLLOWING PROLONGED MAINTENANCE IN ORGANOTYPICAL CULTURE. *(Fr.)* Beaupain, R. (Inst. Embryol. Exp. Teratol., Coll. France, Nogent-sur-Marne). *Ann Histochim* 13(1):89-96, 1968.

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5336 MEGACOLON IN THE OLDER CHILD AND IN THE ADULT. *(Fr.)* Houdard, C. (Rothschild Hosp., Paris, France). *Entret Bichat (Chir)* pp. 49-52, 1968.

5337 NECROSIS OF THE COLON WITHOUT VASCULAR OBLITERATION. *(Fr.)* Clot, J. P. (La Pitié Hosp., Paris, France). *Entret Bichat (Chir)* pp. 31-34, 1968.

5338 PERSONAL EXPERIENCE WITH CANCER OF THE COLON AND RECTUM IN THE AGED. *(Sp.)* Coppolecchia, A. (Avda. de los Incas 4910, Buenos Aires, Argentina), J. Baredes, R. Fernández and J. B. Viqueira Casal. *Rev Asoc Med Argent* 82(6):200-203, 1968.

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5351 ATTEMPTED SIMPLIFICATION OF THE LIMITED EXCISION OF VILLOUS TUMORS OF THE RECTUM BY THE LOW APPROACH. *(Fr.)* Gibert, T. (Paris, France). *Rev Med (Paris)* 9(23):1507-1509, 1968.

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5358 ISCHAEMIC COLITIS. *(E.)* Morson, B. C. (St. Mark's Hosp., London, England). *Postgrad Med J* 44(515):665-666, 1968.

5359 PRECANCEROUS AND EARLY MALIGNANT LESIONS OF THE LARGE INTESTINE. *(E.)* Morson, B. C. (St. Mark's Hosp., London, England). *Brit J Surg* 55(10):725-731, 1968.

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5360 PRODUCTION OF INFLAMMATORY AND ULCERATIVE LESIONS OF THE COLON IN RATS. *(E.)* Auersperg, M. (U. Hosp., Helsinki, Finland) and C. Möller. *Acta Chir Scand* 134(2):147-150, 1968.

In an attempt to produce experimental inflammatory and ulcerative colonic lesions, 70 male Sprague-Dawley rats were divided into 5 different groups, each group being subjected to one of the following procedures: 1) vascular lesions produced by ligating terminal vessels to the transverse colon, 2) obstruction of the bowel by ligatures, 3) vascular lesions and obstruction, 4) sham operation, and 5) untreated controls. Animals were sacrificed on the 4th, 10th, and 21st postoperative day. Among 8 rats with vascular lesions, 5 of the 7 survivors showed necrosis or ulceration on the 4th or 10th day, while 2 had no macroscopic changes. Among 10 rats with obstruction, no changes were noted after 10 days, but thickening of the bowel wall was present on the 21st day. Among 35 rats with both vascular lesions and obstruction, 9 died within 24 hr after operation of infarction of the bowel and peritonitis. Among 19 of these rats sacrificed on the 4th or 10th day, 9 had necrosis or ulceration and 7 had mucosal edema with petechial hemorrhages. Seven of these rats sacrificed on the 21st day had thickening of the bowel wall and shortening of the bowel segment. The combination of vascular lesions and obstruction seems the most appropriate method for studying inflammatory and ulcerative colonic lesions, due to the potentiation of the effects seen with each procedure.

5361 STUDIES OF INTESTINAL FERMENTATION IN ULCERATIVE COLITIS. *(E.)* Montgomery, R. D. (East Birmingham Hosp., Birmingham, England), A. C. Frazier, C. Hood, J. M. Goodhart, M. R. Holland and R. Schneider. *Gut* 9(5):521-526, 1968.

Studies in 23 patients with active ulcerative colitis of 4 weeks to 12 yr duration revealed small intestinal malabsorption in about 33% of 16 cases of total proctocolitis. Jejunal biopsy revealed partial villous atrophy in 2, minor villous abnormalities in 6, and lactase deficiency in 2.8 11 patients with total colitis. There was a consistently abnormal increase in fecal lactic acid and volatile fatty acid excretion in all cases except 4 of localized proctitis. High lactic acid values were related to high stool volumes and the highest lactic acid values were found in colitis patients with steatorrhea. Lactic acid excretion of these cases was higher than in the most severe cases of steatorrhea due to primary small-bowel disease. In 7 out of 12 active colitis cases drastic removal of sugars and starch from the diet led to a fall in fecal lactic acid and stool volume to normal or near-normal levels, and 4 of these patients achieved a lasting clinical remission. The presence of excess lactic acid and volatile fatty acids in bowel fluid implies either an abnormal degree of carbohydrate fermentation or a failure to absorb them, or both. There is evidence of impaired absorption of solutes in both the large and small bowel in patients with severe colitis. It is possible that the irritant effect of these fermentation products may be of clinical significance when they are present in excess.

5362 AMINO ACID INCORPORATION INTO PROTEINS OF HUMAN NORMAL AND ULCERATIVE COLITIS COLONIC MUCOSA. *(E.)* Brotman, M. (Mayo Grad. Sch. Med., Rochester, Minn.). *Gut* 9(5):527-529, 1968.

Incorporation of ^{14}C-labeled amino acids into human colonic mucosal proteins *in vitro* was demonstrated to be energy-dependent. Incorporation by specimens of sigmoid mucosa was reduced by the metabolic inhibitors dinitrophenol (2×10^{-3}M) and cyanide (2×10^{-4}M), as well as by anaerobic incubation, but was not affected by antibiotics. Rates of incorporation (per mg of protein) were significantly lower in 18 ulcerative colitis tissue specimens than in 57 histologically normal specimens. These findings are consistent with a defective regenerative capacity of the colonic mucosa in ulcerative colitis.

5363 PRODUCTION OF EXPERIMENTAL HEMORRHAGIC ULCERATIVE COLITIS BY BACTERIAL IMMUNIZATION. *(Fr.)* Zweibaum, A. (Broussais Hosp., Paris, France), J. C. Morard and B. Halpern. *Path Biol* 16(19/20): 813-823, 1968.

In experiments involving about 2000 Wistar rats of both sexes, immunization with living *E. coli* (0.5×10^7 bacteria from an 18-hr culture, s.c. in Freund's adjuvant) of certain strains (16 of 44 studied) resulted in an experimental ulcerative colitis which was very similar, in symptoms, course, and site and histological characteristics of the lesions, to human ulcerative colitis. The disease was characterized by diarrhea, digestive tract hemorrhage, ulceration of the cecal and colonic mucosa, and a chronic course with no tendency towards spontaneous recovery. It could not be produced by immunization with enterococci, lactobacilli or *B. subtilis*, but its immunological nature was confirmed by the fact that it could also be produced by immunization with killed *E. coli* of the same strains (heated to 60C for 1 hr). Immunofluorescence studies revealed no anticolonic autoantibodies such as might have been produced by a cross reaction between the *E. coli* antigens and the antigens of the colonic mucosa. Development of experimental colitis following immunization could be prevented temporarily by continued administration of the same strain of living *E. coli* p.o., and was prevented permanently or even reversed by oral administration of heterologous strains (5×10^7 - 1×10^9 cells). This indicates that an alteration in the bacterial flora (abnormal proliferation of pathogenic "colitogenic" organisms) probably plays a role in the pathogenesis of ulcerative colitis, at least in the experimental animal. It is concluded that ulcerative colitis is probably not an autoimmune disease.

5364 CAUSES AND FREQUENCY OF MILK INTOLERANCE IN PATIENTS WITH ULCERATIVE COLITIS. *(Fr.)* Tachev, T. (Inst. Postgrad. Med., Sofia, Bulgaria), N. Nedkova-Bratanova, A. Krasteva and V. Petrounov. *Acta Gastroent Belg* 31(2):149-154, 1968.

5365 THE LIVER IN ULCEROHEMORRHAGIC RECTOCOLITIS. *(Fr.)* Parturier-Albot, M. (Hotel Dieu Hosp., Paris, France) and J. Boisson. *Actualites Hepatogastroent Hotel Dieu* 4(2):A142-A146, 1968.

5366 **THE EXTRAINTESTINAL MANIFESTATIONS OF HEMORRHAGIC RECTOCOLITIS.** *(Fr.)* Levrat, M. (Fac. Med., Lyon, France), J. Pasquier and B. Moulinier. *Actualites Hepatogastroent Hotel Dieu* 4(2):A131-A141, 1968.

5367 **CLINICAL FORMS OF ULCEROHEMORRHAGIC RECTOCOLITIS AND ULCERATIVE COLITIS.** *(Fr.)* Parturier-Albot, M. (Hotel Dieu Hosp., Paris, France). *Actualites Hepatogastroent Hotel Dieu* 4(2):A106-A130, 1968.

5368 **A STUDY OF THE BIOLOGICAL DISTURBANCES ASSOCIATED WITH HEMORRHAGIC RECTOCOLITIS.** *(Fr.)* Bernier, J. J. (Paris, France) and M. Bouvry. *Actualites Hepatogastroent Hotel Dieu* 4(2):A147-A164, 1968.

5369 **MEDICAL MANAGEMENT OF ULCERATIVE COLITIS.** *(E.)* Truelove, S. C. (Radcliffe Infirm., Oxford, England). *Brit Med J* 2(5604):539-542, 1968.

5370 **BASIC CHARACTERISTICS OF THE ANTI-COLONIC ANTIBODIES FOUND IN THE SERUM OF A PATIENT WITH ULCERATIVE COLITIS: REPORT OF A CLINICAL CASE.** *(Fr.)* Barbiano di Belgiojoso, G. (Fac. Med. Surg., U. Milan, Italy) and A. M. Cirla. *Acta Gastroent Belg* 31(7):483-491, 1968.

5371 **AN EPIDEMIOLOGICAL STUDY OF ULCERATIVE COLITIS IN COPENHAGEN COUNTY.** *(E.)* Bonnevie, O. (Gentofte Hosp., Hellerup, Denmark), P. Rus and P. Anthonisen. *Scand J Gastroent* 3(4):432-438, 1968.

5372 **THE CONSERVATIVE MEDICAL THERAPY OF ULCERATIVE COLITIS.** *(Ger.)* Martini, G. A. (Med. Clin., U. Marburg a.d. Lahn, Germany) and P. Arend. *Chirurg* 39(10):442-446, 1968.

5373 **MICROANGIOPATHIC HEMOLYTIC ANEMIA IN ULCERATIVE COLITIS.** *(E.)* Lehtinen, M. (U. Central Hosp., Helsinki, Finland), E. Lehtinen and E. A. Nikkila. *Scand J Gastroent* 3(4):417-424, 1968.

5374 **THE MEDICAL TREATMENT OF ULCERATIVE COLITIS.** *(E.)* Watkinson, G. (York Hosp., England). *Postgrad Med J* 44(515):696-707, 1968.

5375 **THE SYSTEMIC COMPLICATIONS OF ULCERATIVE COLITIS.** *(E.)* Watkinson, G. (York Hosp., England). *Postgrad Med J* 44(515):693-695, 1968.

5376 **ULCERATIVE COLITIS: DEFINITION, HISTORICAL BACKGROUND, AETIOLOGY, DIAGNOSIS, NATURAL HISTORY AND LOCAL COMPLICATIONS.** *(E.)* De Dombal, F. T. (Dept. Surg., U. Leeds, England). *Postgrad Med J* 44(515):684-692, 1968.

5377 **THE SURGICAL TREATMENT OF ULCERATIVE COLITIS.** *(E.)* Golighter, J. C. (U. Leeds, England). *Postgrad Med J* 44(515):708-715, 1968.

5378 **CHRONIC ULCERATIVE COLITIS.** *(E.)* Levy, J. S. (U. Arkansas Sch. Med., Little Rock) and L. Riherd. *Amer J Gastroent* 50(3):208-213, 1968.

5379 **POSTOPERATIVE COURSE OF PATIENTS WITH ULCERATIVE VS. GRANULOMATOUS COLITIS.** *(E.)* Panish, J. F. (Cedars-Sinai Med. Ctr., Los Angeles, Calif.), D. B. Nevius and M. P. Lipman. *Amer J Gastroent* 50(3):177-185, 1968.

5380 **TREATMENT OF ULCERATIVE COLITIS WITH SALAZOPYRIN.** *(E.)* Svartz, N. (King Gustaf V Inst., Stockholm, Sweden). *Int Surg* 50(5):421-427, 1968.

5381 **INVOLVEMENT OF THE LABIAL SALIVARY GLAND IN PATIENTS WITH CYSTIC FIBROSIS. III. ULTRASTRUCTURAL CHANGES.** *(E.)* Sweney, L. (Sch. Dent., U. Minnesota, Minneapolis) and W. J. Warwick. *Arch Path* 86(4):413-418, 1968.

The labial salivary glands from 8 normal children (ages 7 to 14 yr) and 5 children with cystic fibrosis (ages 5 to 13 yr) were examined by light and electron microscopy. The only morphologic change consistently seen by light microscopy was the presence of homogeneous, eosinophilic plugs in the cystic-fibrosis glands. In electron microscopic studies the only consistent changes were the plugs and the cells which enclosed the plugs. The ultrastructural morphology of the cells which enclosed the 5 plugs examined suggests that these plugs had formed in acinar tissue. The material in the plugs was flocculent and varied in osmophilia. Two of the 5 plugs examined had extremely osmophilic spicules of unknown origin and composition.

5382 **ENZYME REPLACEMENT THERAPY AFTER PANCREATECTOMY AND IN EXOCRINE PANCREATIC INSUFFICIENCY.** *(Ger.)* Schultis, K. (Surg. Clin., U. Giessen, Germany) and E. Wagner. *Deutsch Med Wschr* 93(36):1685-1691, 1968.

Enzyme replacement therapy with the preparation Nutrizym, which contains a combination of large amounts of pancreatin and the pineapple protease bromelain, was given to a 55-yr-old man who developed a hemorrhagic diathesis and osteoporosis due to decreased vitamin D, K and A absorption following total pancreatectomy for a tumor of the pancreas, and to a 57-yr-old man who developed a dumping syndrome and steatorrhea due to severe pancreatic insufficiency following gastrectomy for recurrent peptic ulcer. Following a control period, dosage was adjusted by evaluating the intake and fecal excretion of nitrogen and fats. In the pancreatectomized patient, a statistically significant improvement in absorption was already achieved at a dose of 3 capsules t.i.d., an effect which was increased at a higher dosage with respect to lipid absorption but not as regards nitrogen absorption. Both the blood picture and the serum protein levels remained constant over a 3-yr period at a dosage of 1-6 capsules t.i.d., and the decreased absorption of fat-soluble vitamins was restored to normal. In the patient with pancreatic insufficiency, the resting secretion showed an absence of proteases and about 20% of the normal lipase activity. Replacement therapy was again successful in normalizing absorption, and only fat absorption could be increased further by doses exceeding 3 capsules t.i.d.

5383 **THE SHARE OF PANCREATIC LYMPH AND BLOOD CIRCULATION IN PANCREATIC SELF-DIGESTION.** *(E.)* Papp, M. (Inst. Exp. Med., Acad. Sci., Budapest, Hungary), S. Ormai and L. Csáky. *Z Ges Exp Med* 147(4):285-290, 1968.

In both normal fasted dogs and dogs with experimental pancreatitis produced by injection of 10 ml homologous bile into the pancreatic duct, the ^{131}I concentration following intrapancreatic administration of ^{131}I-labeled human serum albumin (10 ml diluted 1:20 with dog plasma, at a pressure of 30-50 cm H_2O) was markedly higher in the thoracic duct lymph than in either the femoral artery or the pancreatic vein. Although more isotope left the pancreas by way of the blood than via the lymph during the first 2 hr after injection, during the 3rd hr the contribution of the 2 routes was about equal. Similar experiments with ^{51}Cr-labeled dog erythrocytes yielded no evidence of appreciable clearance from the pancreas. It is emphasized that the lymphatic flow from the pancreas bypasses the liver, and may thus be responsible, while protecting the pancreas against autodigestion, for widespread organ necrosis when the lymph carries excess protein enzymes from a pancreatitic pancreas. On the other hand, the proportion of pancreatic enzymes carried by the bloodstream may be responsible for the development of hepatic necrosis in patients with pancreatitis.

5384 **CARCINOMA OF THE PANCREAS: PALLIATIVE OR RADICAL SURGERY?** *(E.)* Lund, F. (State Hosp., Copenhagen, Denmark). *Acta Chir Scand* 134(6): 461-465, 1968.

A retrospective study on the prognosis of pancreatic carcinoma following either palliative procedures or radical surgery was carried out in 140 patients (88 men and 52 women) treated for cancer of the pancreas between 1953 and 1965. Symptoms (predominantly jaundice, weight loss, and pain) had been present for less than 6 months in 67% of the patients. Diabetes mellitus was noted in 8 and thrombophlebitis developed in 6 patients. In 19 cases the disease was too far advanced to permit any form of therapy, and in 38 cases the only measure still possible was exploratory laparotomy. A biliodigestive anastomosis was constructed in 59 patients; pancreatic-duodenal resection was performed in 24. Of the 57 patients who did not come to surgery or underwent only exploratory laparotomy, 45 died within 3 months. There were only 3 survivors after 1 yr. Among the 59 patients who had a biliodigestive anastomosis, the course of the disease was almost identical. No survivors were left after 18 months. Of the 24 patients who had pancreatic-duodenal anastomosis, there was a mortality of 29% within the 1st month. The death quotient was almost identical to that in the palliative procedure group among the patients who survived the 1st month. Only 1 patient was alive 2½ yr after radical surgery. Average survival was longest among the 10 patients who had ampullary carcinomas. For the whole series, 67% died within 3 months after admission, and 90% were dead within the 1st year. It is felt that radical surgery should continue to be attempted when technically feasible, since it offers better and more lasting palliation, even at the cost of higher primary mortality.

5385 **BACTERIAL PRECIPITINS IN SERUM OF PATIENTS WITH CYSTIC FIBROSIS.** *(E.)*

Burns, M. W. (Inst. Dis. Chest, London, England) and J. R. May. *Lancet* 1(7537):270-272, 1968.

The sera of 30 patients with cystic fibrosis (aged 11-28 yr) were examined for precipitins specific to *Hemophilus influenzae, Diplococcus pneumoniae, Staphylococcus aureus* and *Pseudomonas aeruginosa.* The results were compared with those from atients with chronic bronchitis or bronchiectasis and healthy ontrol subjects. Hemophilus precipitins were found in 80% f the patients with cystic fibrosis and in a similar proportion f those with chronic bronchitis and bronchiectasis, compared vith only 8% of controls. Pseudomonas-specific precipitins vere found in 33% of the cystic fibrosis patients and 15% of hose with bronchiectasis, but in no bronchitis or control atients. Such precipitins were usually found in the serum vhen a mucoid strain of *P. aeruginosa* was present in the putum, and it is suggested that the pseudomonas, particularly ts mucoid variety, can be pathogenic in such chronic destructive lisorders of the bronchi. Staphylococcal antibody was found n 53% of cystic fibrosis patients and 29% of those with bronchiectasis, but in only an insignificant number of bronchitics, ompared with 9% of controls. Pneumococcal antibody was ound in cystic fibrosis patients no more commonly than in the ontrol subjects.

5386 LACTASE DEFICIENCY IN PATIENTS WITH CYSTIC FIBROSIS. *(E.)* Antonowicz, I. (Children's Hosp. Med. Ctr., Boston, Mass.), V. Reddy, K. T. Khaw and H. Shwachman. *Pediatrics* 42(3):492-500, 1968.

Disaccharidase (lactase, maltase, sucrase, and palatinase) assays were performed on small intestinal mucosal biopsies obtained by Crosby-Kugler capsule from 28 patients with cystic fibrosis (21 males and 7 females, 5 months to 22.5 yr old) and 90 normal controls. Oral glucose and lactose and lactose tolerance tests were also performed in 11 cases. Seven of the patients with cystic fibrosis showed a significant reduction in lactase activity with normal values for sucrase, maltase, and palatinase. In the remaining 21 patients with cystic fibrosis, enzymatic activities were comparable with those in the 90 controls. The mucosal histology showed a normal villous structure. Glucose oral tolerance tests revealed excellent absorption in all cases tested. Patients with cystic fibrosis having normal lactase activity also had good lactose absorption. However, in the 7 patients with lactase deficiency, flat oral lactose tolerance curves were obtained. Five of the 7 patients with lactase deficiency were able to tolerate some lactose, whereas 2 others were highly intolerant and required elimination of lactose from their diet. This study reveals a high incidence of intestinal lactase deficiency in patients with cystic fibrosis and suggests that lactase deficiency may be a genetic disorder.

5387 EPIDEMIOLOGY OF PANCREATIC CANCER IN CONNECTICUT. *(E.)* Moldow, R. E. (State Dept. Health, Hartford, Conn.) and R. R. Connelly. *Gastroenterology* 55(6):677-686, 1968.

A retrospective study was carried out based on a sample of the 865 cases of pancreatic cancer reported by 38 hospitals to the Connecticut Tumor Registry between Jan. 1957 and Dec. 1963. The study group of 257 patients had an average age of 64.4 yr; there were 153 men and 104 women, the latter being significantly older at the time of diagnosis. Negroes, accounting for 11% of the cases, appeared to be at a greater risk of developing the disease. Seasonal variation was noted, with peaks in May and August, but incidence was independent of marital status, religion, nativity, and residence. Pain was the most common symptom; hepatomegaly and jaundice were the most frequent physical findings. An upper gastrointestinal series suggested a pancreatic lesion in 40% of cases in which the tumor was located in the head of the pancreas. Serum alkaline phosphatase and erythrocyte sedimentation rate were the most consistent abnormal laboratory findings, being elevated in 80% of the patients. The cancer involved the head of the pancreas in 60% of cases in which the site was specified; body and/or tail was involved in 30%. Adenocarcinomas comprised 70% of cases with known histological type. The tumor was confined to the pancreas in only 11% of patients at the time of diagnosis; 26% demonstrated local invasion or lymph node spread, and the remaining 63% exhibited distant metastasis. Distant metastasis was associated less frequently with cancer of the pancreatic head than with tumors of other pancreatic sites. Biliary tract disease was a secondary diagnosis in 20% of the patients; a history of diabetes mellitus was present in 10%. Seven patients underwent curative surgery; 105 had palliative procedures. Chemotherapy and X-ray treatment were employed rarely. Prognosis was extremely poor: only 9% survived for 1 yr, and the average survival from time of diagnosis was 4.3 months. Patients with palliative therapy had a better prognosis than those not treated, but the only 5-yr survivor was among the group treated by curative surgery.

5388 PRESERVATION OF EXOCRINE FUNCTION AS A PREREQUISITE FOR SUCCESSFUL TRANSPLANTATION OF THE PANCREAS. *(Ger.)* Largiadèr, F. (Surg. Clin., U. Zurich, Switzerland), J. Hegglin, A. Jakob and H. U. Meili. *Helv Chir Acta* 35(1/2):321-326, 1968.

5389 PANCREATICO-DUODENECTOMY: FORTY-ONE CONSECUTIVE WHIPPLE RESECTIONS WITHOUT AN OPERATIVE MORTALITY. *(E.)* Howard, J. M. (Hahnemann Med. Coll. Hosp., Philadelphia, Pa.). *Ann Surg* 168(4):629-640, 1968.

5390 PATTERNS OF HEMORRHAGE INTO PANCREATIC PSEUDOCYSTS. *(E.)* Dardik, I. (Montefiore Hosp. Med. Ctr., Bronx, N. Y.) and H. Dardik. *Amer J Surg* 115(6):774-776, 1968.

5391 HEMORRHAGIC PLEURISY DUE TO A CANCER OF THE PANCREAS AND ACCOMPANIED BY ELEVATED PLEURAL AMYLASE. *(Fr.)* Brocard, H. (Tenon Hosp., Paris, France), G. Akoun and B. Lesage. *J Franc Med Chir Thorac* 22(2):143-154, 1968.

5392 PANCREATIC INSUFFICIENCY AND VITAMIN B_{12} MALABSORPTION. *(E.)* LeBauer, E. (Ohio State U. Coll. Med., Columbus), K. Smith and N. J. Greenberger. *Arch Intern Med* 122(5):423-425, 1968.

5393 PREOPERATIVE DETERMINATION OF OPERABILITY IN CARCINOMAS OF THE PANCREAS AND THE PERIAMPULLARY REGION. *(E.)* Santo, T. (Tohoku U. Sch. Med., Sendai, Japan), Y. Saitoh, K. Koyama and K. Watanabe. *Ann Surg* 168(5):876-886, 1968.

5394 THE SURGICAL MANAGEMENT OF TRAUMATIC RUPTURE OF THE PANCREAS DUE TO BLUNT TRAUMA. *(E.)* Weitzman, J. J. (U. Southern California Med. Ctr., Los Angeles) and P. D. Rothschild. *Surg Clin N Amer* 48(6):1347-1353, 1968.

5395 **PLEURAL EFFUSIONS OF PANCREATIC ORIGIN.** *(Fr.)* Bertrand, L., P. Carabalona, H. Michel and M. Laux. *Montpellier Chir* 14(2):263-272, 1968.

5396 **DETERMINING THE LIMITS OF INVOLVEMENT IN CARCINOMA OF THE PANCREAS.** *(Rus.)* Mikhailichenko, V. A. (Donetsk Med. Inst., USSR) and N. M. Rovenskaia. *Klin Khir (Kiev)* 6(8):1-4, 1968.

5397 **POSSIBLE LOCALISATION OF THE GENE FOR CYSTIC FIBROSIS OF THE PANCREAS TO THE SHORT ARM OF CHROMOSOME 5.** *(E.)* Smith D. W. (U. Washington Sch. Med., Seattle), J. M. Doctor, P. E. Ferrier, J. L. Frias and A. Spock. *Lancet* 2(7563):309-312, 1968.

5398 **PANCREATIC DISEASE: SURGICAL ASPECTS.** *(E.)* Pollock, A. V. (Scarborough Hosp., England). *Postgrad Med J* 44(515):737-741, 1968.

5399 **ISOLATED BLUNT TRAUMA OF THE PANCREAS.** *(Ger.)* Maurer, G. (Surg. Clinic Rt. Bank of the Isar, Munich Inst. Technol., Germany) and H. Scholze. *Langenbeck Arch Klin Chir* 320(2/3):235-246, 1968.

See also abstract nos.: 4669,4684,4687,4851,4852,4858

Pancreatitis

5400 **INSULIN RESERVE IN PATIENTS WITH CHRONIC PANCREATITIS.** *(E.)* Joffe, B. I. (Groote Schuur Hosp., Cape Town, South Africa), S. Bank, W. P. U. Jackson, P. Keller, I. G. O'Reilly and A. I. Vinik. *Lancet* 2(7574):890-892, 1968.

Sixteen patients with unequivocal evidence of chronic pancreatitis were subjected to intensive β-cell stimulation by combined i.v. injection of glucagon (1 mg) and tolbutamide (0.5 g) 30 min after administration of 75 g of oral glucose; results were compared with those in 10 normal controls. The serum-immunoreactive-insulin responses of the entire group of patients were significantly impaired, and the degree of impairment seemed to be proportional to the degree of glucose intolerance. It is postulated that the diabetic syndrome of chronic pancreatitis represents an example of acquired insulinopenia and is thus a valuable clinical model for assessing the effects of this in man.

5401 **THE VASCULAR MORPHOLOGY OF THE PANCREAS IN ACUTE EXPERIMENTAL PANCREATITIS DUE TO CREATION OF A CLOSED DUODENAL LOOP IN THE DOG: III) AFTER 10-12 HOURS; IV) AFTER 14-16 HOURS; V) AFTER 18-20 HOURS; VI) AFTER 20 HOURS WITH A LIGATED PANCREATIC DUCT.** *(It.)* Cavallari, A. (Inst. Gen. Clin. Surg., U. Bologna, Italy), G. Galletti, C. Battisti, F. Farruggia, G. Martinelli and P. Berardi. *Boll Soc Ital Biol Sper* 44(8):773-778, 1968.

In dogs sacrificed 10, 12, 14, 16, 18 or 20 hr after the creation of a closed duodenal loop (procedure of Pfeffer), the pancreatic vasculature showed progressive morphological changes accompanied by marked histological alterations in the pancreatic parenchyma. While the intralobular and perilobular blood vessels became increasingly contorted, acquiring a "pseudoglomerular" appearance, the parenchymal tissue revealed the progressive development of acute pancreatitis, beginning about 12 hr after surgery with alterations in capillary permeability resulting in the transudation of plasma into the interstitial spaces and consequent cellular involution. By 16 hr after surgery the vascular architecture of the pancreas, particularly the intralobular vessels, was largely obscured by extravasation of contrast medium into the parenchyma; the excretory ducts, although swollen and showing signs of external inflammation, retained an intact epithelial lining. Rupture of the pancreatic ducts with discharge of necrotic material into the lumen was first noted 18-20 hr after surgery, but even then the ductal mucosa remained intact. It is concluded that experimental pancreatitis in dogs progresses through 3 stages: transudation of plasma through the capillary walls, inflammation of the parenchyma, and involvement of the pancreatic ducts proceeding from the outside inward. In dogs sacrificed 20 hr after the Pfeffer procedure plus ligation of the main pancreatic duct, the vascular changes and pancreatitic involvement of the parenchymal tissue were the same as described above, but rupture of the pancreatic ducts did not take place and they contained no necrotic material, only pancreatic secretions. The pancreatitis produced by the Pfeffer procedure is therefore not due to reflux of duodenal contents.

5402 **PANCREATITIS IV: MANAGEMENT OF PATIENTS WITH CHRONIC PANCREATITIS.** *(E.)* White, T. T. (Doctors Hosp., Seattle, Wash.), J. E. Murat and A. Morgan. *Northwest Med* 67(7):643-649, 1968.

Among 733 patients with pancreatitis, 179 (24%) had X-ray evidence of calcification, or operative or autopsy evidence of pancreatic fibrosis, in addition to a history of recurrent or continuous upper abdominal and back pain, and 106 of these cases (59%) could be ascribed to alcoholism; another 54 patients had associated calcification, 17 had gallstones (but none in the common bile duct), and 28 had diabetes. The diagnosis and treatment of chronic pancreatitis are discussed on the basis of this experience, and 4 case reports (males, 37-51 yr old) are presented to illustrate the beneficial effects of pancreatic cyst incision, pancreaticojejunostomy, choledochoduodenostomy and excision of associated ulcers, and celiac ganglionectomy, resp. Although 22 of the 179 patients were jaundiced, the principal diagnostic symptoms were the characteristic abdominal pain and body posture; the use of biochemical tests is also discussed. In addition to complete abstinence from alcohol and moderation in eating habits, the main treatment is surgical, and the only effective procedures are pancreaticojejunostomy, 95% resection of the pancreas, and splanchnicectomy with partial celiac ganglionectomy; the latter procedure should be reserved for patients with a small fibrotic pancreas and neither pancreatic duct dilatation nor gallstones. Sphincterotomy and external pancreatic or bile duct drainage are not effective procedures for chronic pancreatitis. Pancreatic cysts should be opened, together with unroofing of the adjacent pancreatic duct structure and Roux-en-Y pancreaticojejunostomy. By a proper choice of procedure, symptomatic relief can be provided for 50-75% of patients with chronic pancreatitis.

5403 **"STEROID" PANCREATITIS: A REVIEW OF THE LITERATURE.** *(Rus.)* Trunin, M. A. (Inst. Sanit. Hyg. Med., Leningrad, USSR) and O. S. Kochnev. *Vestn Khir Grekov* 100(5):127-128, 1968.

5404 **PANCREATIC ENCEPHALOPATHY AND AMYLASE IN THE SPINAL FLUID.** *(Fr.)* Seror, J. (Algiers Surg. Clin., Algeria), B. Mentouri, H. Issad and Hamad. *Ouest Med* 21(9):749-756, 1968.

5405 **RESULTS OF A TRIAL OF THE ENZYME INHIBITOR TRASYLOL IN ACUTE PANCREATITIS.** *(Ger.)* Grozinger, K. H. (Surg. Clin., U. Heidelberg,

5406 **CLINICAL FORMS OF PURULENT PANCREATITIS.** *(Rus.)* Pozdniakov, V. T. (I. N. Pirogov 2nd Moscow Med. Inst., USSR). *Sovet Med* 31(8): 22-25, 1968.

5407 **DISTURBANCES IN CARBOHYDRATE REGULATION DURING CHRONIC PANCREATITIS: THE VALUE OF DETERMINATIONS OF BLOOD INSULIN LEVELS.** *(Fr.)* Paris, J. (Munic. Hosp., Lille, France), J. C. Fourlinnie, A. Gerard, J. Lescut, J. C. Paris and M. Linquette. *Arch Franc Mal Appar Dig* 57(6/7):575-591, 1968.

5408 **PANCREATITIS AND AORTIC STENOSIS.** *(Fr.)* Dupuy, R. (Paris, France) and D. Boutelier. *Actualites Hepatogastroent Hotel Dieu* 4(2):B61-B68, 1968.

5409 **HEREDITARY PANCREATITIS. [CASE REPORT]** *(E.)* Whitten, D. M. (Tufts U. Sch. Med., Boston, Mass.), M. Feingold and E. J. Eisenklam. *Amer J Dis Child* 116(4):426-428, 1968.

5410 **THE ACID-BASE BALANCE AND BLOOD LACTIC AND PYRUVIC ACID LEVELS IN PATIENTS WITH ACUTE PANCREATITIS.** *(Rus.)* Ambartsumian, R. G. (N. I. Pirogov 2nd Moscow Med. Inst., USSR) and V. G. Zaitsev. *Klin Med (Moskva)* 46(7):106-110, 1968.

5411 **THE ROLE OF ALCOHOL IN THE DEVELOPMENT OF PANCREATITIS.** *(Rus.)* Kochnev, O. S. (Kazan Inst. Postgrad. Med., USSR). *Klin Med (Moskva)* 46(7):29-32, 1968.

5412 **PANCREATITIS WITH DIABETIC COMA.** *(Ger.)* Hayduk, K. (Med. Clin., U. Tubingen, Germany), W. Kaufmann and R. Diem. *Med Welt* 19(36):1936-1940, 1968.

5413 **CHRONIC PANCREATITIS: CLINICAL STUDY.** *(E.)* Reynaert, J. (St. Rafael Acad. Hosp., Louvain, Belgium), J. De Groote and J. Vandenbroucke. *T Gastroent* 11(3):268-280, 1968.

5414 **GASTROINTESTINAL FISTULAS COMPLICATING ACUTE PANCREATITIS.** *(Rus.)* Lashchevker, V. M. (Odessa Munic. Clin. Hosp. No. 1, USSR). *Klin Khir (Kiev)* 6(8):8-10, 1968.

5415 **CLINICAL AND MORPHOLOGICAL PARALLELS IN ACUTE NECROSIS OF THE PANCREAS.** *(Rus.)* Zaitsev, G. P. (N. I. Pirogov 2nd Moscow Med. Inst., USSR) and V. T. Pozdniakov. *Klin Khir (Kiev)* 6(8):5-7, 1968.

5416 **A TRIAL OF EPSILON-AMINOCAPROIC ACID (EACA) IN THE TREATMENT OF CHRONIC PANCREATITIS: PRELIMINARY REPORT.** *(Pol.)* Wawrzynski, E. (Pasteur Hosp., Lodz, Poland), C. Rozycki and B. Majzel. *Endokr Pol* 19(4):463-468, 1968.

5417 **PANCREATITIS: PRINCIPLES OF MANAGEMENT.** *(E.)* Zimberg, Y. H. (VA Hosp., Richmond, Va.). *Surg Clin N Amer* 48(4):889-905, 1968.

5418 **GASTRIC SECRETION IN PATIENTS WITH CHRONIC PANCREATITIS AND IN CHRONIC ALCOHOLICS.** *(E.)* Chey, W. Y. (Temple U. Health Sci. Ctr., Philadelphia, Pa.), O. Kusakcioglui, V. Dinoso and S. H. Lorber. *Arch Intern Med* 122(5):399-403, 1968.

5419 **ENDOCRINE AND EXOCRINE PANCREATIC FUNCTION IN PANCREATITIS.** *(E.)* Ohlsen, P. (Karolinska Hosp., Stockholm, Sweden). *Acta Med Scand* (Suppl. 484):7-99, 1968.

5420 **CHRONIC PANCREATITIS: MEDICAL ASPECTS.** *(E.)* Howat, H. T. (Manchester Royal Infirm., England). *Postgrad Med J* 44(515):733-736, 1968.

5421 **LONG-TERM DRAINAGE OF THE THORACIC DUCT IN PATIENTS WITH ACUTE AND CHRONIC PANCREATITIS.** *(Ger.)* Bartos, V. (1st Med. Clin., Charles U., Hradec Kralove, Czechoslovakia) and V. Brzek. *Aktuel Gastroent* pp. 68-70. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme 1968. 376 pp.

See also abstract no.: 4778

LIVER AND BILIARY TRACT
GENERAL

5422 **MORTALITY FROM INFECTIOUS HEPATITIS, HEPATIC CIRRHOSIS, AND ACUTE AND SUBACUTE NECROSIS (YELLOW ATROPHY) OF THE LIVER IN POLAND DURING 1959-65. PART II.** *(Pol.)* Magdzik, W. (State Inst. Hyg., Warsaw, Poland). *Przegl Epidem* 22(2):223-236, 1968.

Based on data from the Central Bureau of Statistics and the Polish Ministry of Health and Public Welfare in Warsaw, the mortality rates from hepatic cirrhosis and acute yellow atrophy of the liver, resp., increased from 2.96 to 5.94 and from 0.37 to 0.53 per 100,000 during the period 1959-64, accounting for 874-1881 and 116-163 deaths per year, resp. The mortality from cirrhosis was relatively low compared to such countries as Chile, Japan, the USA and the countries of Southwestern Europe, but was comparable to that in Scandinavia, Southeastern Europe and Israel. As in all countries, the rate increased sharply with age above 25 yr, and was higher in men than in women. It was also particularly high in Warsaw and other large cities. The mortality from yellow atrophy of the liver, on the other hand, was somewhat higher in women than in men, and was high in both newborn infants and older persons, especially in the cities. The relative importance of the various etiological factors in these diseases is unknown, but it is strongly urged that deaths due to viral hepatitis should be classified separately, with a subdivision into epidemic and serum hepatitis whenever possible.

5423 **LATE EFFECTS OF BILIARY STASIS ON THE EFFECTIVE LIVER BLOOD FLOW.** *(E.)* Aronsen, K. F. (Gen. Hosp., Malmö, Sweden). *Acta Chir Scand* 134(3/4):278-281, 1968.

The effective liver blood flow was studied in 87 patients (56 females and 31 males, 18-79 yr old) in whom selected cholecystectomy and successful extraction of common duct stones had been performed as curative measures for biliary stasis of varying degrees and duration 1 or 5 yr previously, and in 20 controls (12 males and 8 females, 29-79 yr old) with no known hepatobiliary or cardiovascular disease; liver function was normal at the time of follow-up in all cases. Liver blood flow was estimated by the clearance of radioactive colloidal gold (20 μC of ^{198}Au injected i.v.) BSP retention and BSP clearance and extraction (calculated from BSP retention). Control values showed no effect of age. In 25 of the 37 patients who had biliary stasis for less than 15 days, the effective liver blood flow was normal, and 9 of the other 12 had had cholelithiasis for over 5 yr. In all 50 patients who had biliary stasis for longer than 15 days, the effective liver flow was about 50% of normal. There was no difference between the groups studied 1 and 5 yr postoperatively, and the results were unrelated to the serum bilirubin at the time of surgery. The results suggest that a persistent reduction in the effective liver blood flow may be caused by biliary stasis exceeding 15 days in duration or cholelithiasis exceeding 5 yr in duration.

5424 **AUXILIARY HOMOTRANSPLANTATION OF THE CANINE LIVER WITH THE USE OF A "REVERSE" WELCH TECHNIQUE.** *(E.)* Daloze, P. M. (U. Colorado Sch. Med., Denver), C. Huguet, K. A. Porter and T. E. Starzl. *Surgery* 64(5):934-939, 1968.

Auxiliary liver homografts, which were placed ectopically in the lower abdomen of 11 unrelated mongrel dogs, were revascularized with an arterial blood supply from the aorta and a portal venous supply from the host splanchnic bed (cavoportal anastomosis). The recipients' own livers were supplied only with systemic venous blood and deprived of splanchnic blood. The postoperative course was followed by means of biweekly liver-function studies and liver biopsy and blood flow measurement after 1, 3, and 6 weeks. In 8 recipients, all vascular anastomoses remained unobstructed until the animal died or was sacrificed at 20-56 days; these homografts, which had a mean blood flow of 244 ml/min/100 g tissue of 3 weeks, lost an average of 62 g, while the host's own liver, which had a mean flow of 231 ml/min/100 g tissue at 3 weeks, gained an average of 18 g; rejection occurred in 6 of the 8 animals (3 mild, 1 moderate, and 2 severe). In 3 animals which died or were sacrificed after 12-74 days, thrombosis developed at the cavoportal anastomosis; these homografts lost an average of 63 g, the host liver lost an average of 10 g, and rejection occurred in 2 animals (severe in both). Both groups of dogs showed early marked and later chronic low-grade elevations in serum glutamic-oxaloacetic transaminase, serum glutamic-pyruvic transaminase, and alkaline phosphatase, plus anemia. The atrophy often seen after auxiliary transplantation can thus be reduced, but not prevented, by a technique which supplies the graft with splanchnic blood.

5425 **HEPATOMA AND GROUNDNUTS IN THE WEST NILE DISTRICT OF UGANDA.** *(E.)* Korobkin, M. (Yale U. Sch. Med., New Haven, Conn.) and E. H. Williams. *Yale J Biol Med* 41(1):69-78, 1968.

A statistically significant similarity was found between the village distribution of the 25 patients (22 men and 3 women) presenting with hepatoma (clinical diagnosis only) at the Kuluva Mission Hospital over a 15-yr period (1951-65) and the distribution of groundnut (peanut) cultivation in the West Nile District of Uganda, an area of 4146 square miles with a population of about 400,000 people divided into 3 main tribes; however, the population distribution, the small number of cases, and the lack of fungal cultures obscures the exact meaning of the similarity. There was no seasonal variation in incidence. Although all types of cancer (hepatoma, Burkitt's lymphoma, carcinomas of various organs) tended to be concentrated in areas with greater than 100 persons/sq. mile, there was a suggestion of possible differences in distribution, the most striking being the absence of hepatoma in those areas where no peanuts are cultivated. The hepatomas may have been caused by infection of the peanuts with an aflatoxin-producing strain of *Aspergillus flavus,* which has been shown to induce tumors in a variety of experimental animals. However, a well-controlled study of hepatoma patients is needed, including on-the-spot analysis of peanuts for fungal contamination and assay for aflatoxin.

5426 **WILSON'S DISEASE IN INDIA: I. GEOGRAPHIC, GENETIC, AND CLINICAL ASPECTS IN 16 FAMILIES.** *(E.)* Dastur, D. K. (J. J. Group Hosp., Bombay, India), D. K. Manghani and N. H. Wadia. *Neurol India* 18(1):21-31, 1968.

Genetic, clinical, epidemiological and biochemical studies on 25 Indian patients (16 males and 9 females, most 5-15 yr old at onset of illness) with Wilson's disease, belonging to 18 families with a total of 80 siblings (either unaffected or with a history of hepatic or neurological symptoms), revealed no particular predilection for any racial, religious or geographic group but a 1:3.2 ratio of affected/unaffected siblings which is close to the theoretical value for a Mendelian recessive trait. The low consanguinity rate of only 27.7% indicates that unrelated families may harbor recessive genes for Wilson's disease. All 25 patients had Kayser-Fleischer corneal rings, although 5 were otherwise asymptomatic when studied. The most common symptoms were hepatomegaly (21 cases) and neurological disorders (19 cases), including tremors, involuntary movements, mental deficiency and speech disturbances; 6 patients had signs of hepatic insufficiency and 9 (including 2 without any definite hepatic or neurological symptoms) had signs of osseomuscular involvement and rickets. Five of the predominantly neurological patients and one of the predominantly hepatic patients died. The results of treatment with dimercaprol (BAL) or penicillamine could not be evaluated, since treatment was sporadic, but one patient with coarse tremors of the right hand did show remarkable improvement after electrocoagulation of the ventrolateral nucleus of the thalamus.

5427 CHANGES IN COAGULATION FACTORS AFTER HEPATIC DEARTERIALIZATION IN MAN.

(E.) Almersjö, O. (Sahlgren Hosp., Göteborg, Sweden), S. Bengmark, L. O. Hafström, K. Korsan-Bengtsen and J. Ygge. *Amer J Surg* 116(3):414-418, 1968.

In 5 patients (3 men and 2 women, 58-74 yr old) with metastatic cancer of the liver, hepatic dearterialization was followed by a significant decrease in plasminogen and factor II, VII and X (PP) activity, with no significant change in blood platelets. Blood fibrinogen (factor I) decreased in 3 patients with high preoperative levels and increased in 2 patients with normal preoperative fibrinogen levels, an increase being normally observed after surgery of any type. Factor V (proaccelerin) activity decreased in 2 of 4 cases (including one with a low preoperative value and one with a high preoperative value), and factor VIII (antihemophilic factor A) activity increased in 3 patients while decreasing in 2 (including one of the 2 in whom it was above normal preoperatively). It is concluded that both hepatic dearterialization and hepatic resection result in a decrease in the synthesizing capacity for blood coagulation factors. The postoperative course was uneventful in 3 of these 5 patients, while the 2 oldest died 3-24 days postoperatively.

5428 LIVER TRANSPLANTATION FOLLOWING EXTRACORPOREAL HYPOTHERMIA. *(E.)*

Cree, I. C. (Dept. Surg., U. Saskatchewan, Saskatoon, Canada), T. Hayashi and D. B. Bernardez. *Canad J Surg* 11(4):452-463, 1968.

In 102 adult mongrel dogs, the common bile duct, the gastrohepatic omentum and all accessible hepatic lymphatics were ligated and divided, and 92 of the dogs received liver homotransplants. The donor organ was perfused through a venous catheter while the venous anastomoses were performed. While 34 dogs received livers that had been flushed with Ringer's lactate solution (4C) and refrigerated for up to 6 hr (4-6C), 36 dogs received livers immediately, either from heparinized donors or after the donor liver had been flushed with Ringer's lactate solution (4C). In 13 dogs, a portacaval shunt was created and their livers were removed after the donor liver was transplanted. The control dogs showed gross biochemical abnormalities (a rapid rise in serum bilirubin and alkaline phosphatase). In dogs that received livers refrigerated outside the body for periods as long as 4 hr, such indices of liver function were relatively undisturbed until transplant rejection occurred. When the dog's own liver was removed at the time the refrigerated livers were inserted, the dogs bled heavily and survival was poor. Dogs survived longer if hepatectomy was delayed for 24 hr. *In vivo* perfusion during venous anastomosis permitted the donor livers to be kept at low temperatures until the hepatic circulation was restored; this greatly reduced anoxic damage to the liver. This study suggests that extracorporeal cooling preserves the liver while the recipient site is being prepared for transplantation. It is believed that this technique can be adapted for clinical use.

5429 HYPOTHERMIC LOW FLOW LIVER PERFUSION AS A MEANS OF PORCINE HEPATIC STORAGE FOR SIX HOURS. *(E.)*

Hobbs, K. E. F. (U. Bristol, England), A. C. Hunt, D. B. Palmer, F. E. Badrick, A. M. Morris, S. K. Mitra, J. H. Peacock, E. J. Immelman and A. G. Riddell. *Brit J Surg* 55(9):696-703, 1968.

Dynamic measurements of oxygen consumption, bile production, and the clearance of indocyanine green, ammonia and lactate demonstrated that the isolated pig liver, perfused with autogenous blood diluted with Rheomacrodex at 38C and a flow rate of 1 ml/g of tissue/min, functions fairly well for about 5 hr. This experimental model is therefore satisfactory for investigating the maintenance of various aspects of liver function during storage. Subsequent studies showed that hypothermic perfusion of a liver at 8C using dilute autogenous blood as the perfusate at flow rates of 0.1 ml/g of tissue/min causes little damage when function is assessed by these methods. Although glycogen content fell, the histology of the stored livers was well preserved, and septal edema could be eliminated by replacing Rheomacrodex by Macrodex. It may be that liver function, although initially impaired, rapidly returns to normal during storage under these conditions. However, the only reliable way to verify this would be to test the ability of the preserved liver to maintain life following transplantation. Since no gross liver damage occurred after 6 hours of storage with hypothermic perfusion, further studies along these lines are justified.

5430 A CONTRIBUTION TO THE STUDY OF JOINT INVOLVEMENT IN HEMOCHROMATOSIS.

(Fr.) Francon, F., J. Epiney, H. Blanchard, L. Joly, E. Visniks and R. Diaz. *Presse Med* 76(38):1809-1812, 1968.

The etiology, pathogenesis, clinical and radiological characteristics, laboratory findings, diagnosis, course, prognosis, prevention and treatment of the joint diseases (decalcification and chondrocalcinosis) which sometimes complicate hemochromatosis are discussed on the basis of 6 personal cases (3 men an d 3 women) and a review of the literature. All 6 patients had primary familial hemochromatosis with diabetes and joint disease which appeared at the age of 36-63 yr (average 47.1 yr). Joint symptoms preceded the diagnosis of hemochromatosis by 3-18 yr in 3 cases and followed it by 1-8 yr in the other 3 cases. Cirrhosis was present in 4 cases, but the other manifestations were quite variable. Decalcification was noted in 5 cases, chondrocalcinosis in 4, and all showed involvement of the metacarpal joints and phalanges, which is almost a pathognomic sign. Laboratory studies showed increased serum Fe levels and increased siderophilin saturation. Although the mechanism of calcium precipitation in this disease remains unclear, the role of calcium and iron metabolism in the pathogenesis of metabolic arthropathy is emphasized. Although movement is not severely limited, the disease does shorten life. Treatment must be directed at all 3 components of the disease (hemochromatosis, diabetes, arthropathy), and one of the most effective measures against the joint complications is balneotherapy.

5431 **PRIMARY DEPOSITION OF "BROWN PIGMENT" IN THE LIVER: THE PROBLEM OF THE LIPOFUSCINS.** *(Fr.)* Paraf, A. (Franco-Moslem Hosp., Bobigny, Paris, France), A. Lageron and J. Trad. *Bull Mem Soc Med Hop Paris* 119(6):511-518, 1968.

Detailed case histories are presented for 3 patients (2 men and 1 woman, 37-61 yr old) with moderate hepatomegaly in whom deposition of a brown pigment was the only abnormality detectable on liver biopsy. These patients presented with asthenia, dyspepsia, and neuroautonomic and endocrine disturbances but a normal iron metabolism which ruled out a diagnosis of hemochromatosis; one had migraine and one was a diabetic. In one case, the hepatic findings remained the same on a 2nd biopsy taken 11 yr later. Histochemical studies revealed a yellow-brown pigment, variable in concentration, which was tributed mainly pericanalicularly in the hepatocytes with rare involvement of the Küpffer cells and macrophages; acid-fast staining revealed the presence of unsaturated lipids, but the precise nature of the pigment remains in doubt. Comparison with specimens of human hepatic melanosarcoma and turtle liver showed that the pigment differs in some respects from the lipofuscins or melanins. However, a similar brown pigment has been observed in the families of patients with the hereditary Dubin-Johnson syndrome, even in the absence of jaundice.

5432 **THE CHOLESTEROL ESTER COMPOSITION OF THE SERUM IN ALCOHOLICS AND PATIENTS WITH ZIEVE'S SYNDROME.** *(Ger.)* Knüchel, F. (Konigstuhl Clin. Int. Dis., Heidelberg-Kohlhof, Germany). *Med Welt* 6(6):367-378, 1968.

Biochemical studies in 9 patients (25-62 yr old) with Zieve's syndrome due to prolonged alcoholism revealed marked hyperlipidemia (1.994 g%) along with a characteristically abnormal distribution of fatty acids among the cholesterol acids. The proportions of the esters of linolenic, arachidonic and especially linoleic acid were decreased in favor of a relative increase in cholesterol palmitate, stearate, and especially oleate and palmitoleate. Moreover, the cholesterol ester composition remained significantly abnormal even after 4-6 weeks of alcohol withdrawal, by which time the liver function tests had been normalized and the serum lipid levels had fallen to an average of 705 mg%. In nonalcoholic controls, the cholesterol ester composition was consistently normal regardless of the serum lipid levels. In 8 alcoholics, however, even though there were no signs of Zieve's syndrome and the average serum lipid level was only 194 mg%, the cholesterol ester composition resembled that in the 9 cases of Zieve's syndrome. On the other hand, the cholesterol ester composition was normal in 4 cirrhotics. On the basis of the known inhibitory effect of prolonged alcohol consumption on lipid catabolism and lipolysis, it is suggested that this forces hepatic cholesterol synthesis to rely upon the dietary fatty acids, the composition of which tends to resemble that of the cholesterol esters in Zieve's syndrome.

5433 **ABNORMALITIES OF ERYTHROCYTE STROMAL LIPIDS IN HEPATIC DISEASE.** *(E.)* Neerhout, R. C. (UCLA Sch. Med., Los Angeles, Calif.). *J Lab Clin Med* 71(3):438-447, 1968.

A detailed analysis is presented of the erythrocyte stromal lipid composition in 24 patients with various forms of hepatic disease. The increased erythrocyte stromal total lipid content found in these patients was almost totally due to equivalent increases in cholesterol and phosphatidyl choline on a weight per cell basis. Phospholipid fatty acid patterns showed increased palmitic and oleic acids with decreasing stearic, arachidonic, and longer-chain fatty acids. There was a trend toward an increased percentage of phosphatidyl choline in the erythrocyte stroma from localized hepatic disease and chronic cirrhosis through patients with more active cellular disease to patients with biliary obstruction. The only common denominator among the patients studied was the presence of liver disease involving primarily the portal area. Whether the abnormalities noted are induced by association of the erythrocytes with an altered plasma environment or are the direct result of altered hepatic cellular or erythrocytic function is not clear.

5434 **INCIDENCE OF PARAPROTEINS IN CHRONIC LIVER DISEASES.** *(E.)* Englišová, M. (Postgrad. Med. Inst., Charles U., Prague, Czechoslovakia), M. Engliš, V. Hoenig and J. Hoenigová. *Scand J Gastroent* 3(4):413-416, 1968.

The occurrence of paraproteinemia was investigated by paper electrophoresis, screening electrophoresis in agar gel and immunoelectrophoresis in 276 patients with various forms of chronic liver disease (portal cirrhosis, biliary cirrhosis and hepatitis). Only 5 of the 276 patients were found to have paraproteins. This incidence did not differ significantly from that found in the normal population, indicating that the occurrence of benign monoclonal hyperglobulinemia in chronic liver disease is purely coincidental.

5435 **GASTRIC ACID PRODUCTION IN JAUNDICE.** *(E.)* Williams, C. B. (Welsh National Sch. Med., Cardiff, Wales), J. H. Lawrie, P. R. Baker and A. P. M. Forrest. *Lancet* 1(7539):388-390, 1968.

Basal and maximal acid outputs were measured in 42 patients with jaundice of known etiology (29 men and 13 women, 20-77 yr old) and compared with the results obtained in 25 control subjects. The maximal acid output was estimated by histamine-infusion tests after a 12-hr fast, and after the collection of basal secretion for 4 successive 15-min periods. The basal outputs did not differ in the 2 groups, but the mean maximal acid output for the jaundiced patients was 10.8 mEq/hr compared with 20.0 mEq/hr in the controls. Eighteen of the patients with jaundice were achlorhydric. The acid secretory response was not of value in differentiating the different types of jaundice. The reduction in acid output was related to the age of the patient but not to quantitative tests of liver function. The reason for the decrease in gastric acid secretion in patients with jaundice remains unclear.

5436 ROUTE OF ENTRY OF *CLONORCHIS SINENSIS* TO THE MAMMALIAN LIVER. *(E.)*

Sun, T. (Dept. Path., U. Hong Kong), S. T. Chou and J. B. Gibson. *Exp Parasit* 22(3):346-351, 1968.

When metacercariae were fed to 15 rats and 7 rabbits in which the common bile duct had been ligated and severed, no adult flukes were found subsequently in the livers or ducts of any of the animals. In control animals infected the same way, adult flukes were invariably found in the usual segments of the bile ducts. Serum bilirubin determinations performed on 3 rabbits in which the common bile duct was merely ligated and not severed showed initial elevations that began to fall on the 3rd day. Simple ligation thus did not provide a reliable obstruction of the duct during the period in which the parasite can survive. This study confirms that the common bile duct is the only natural route taken by *C. sinensis* from the duodenum to the liver.

5437 TUMORS OF THE LIVER, KIDNEY AND LUNGS IN RATS FED *ENCEPHALARTOS HILDEBRANDTII.* *(E.)*

Mugera, G. M. (Dept. Vet. Path. Microbiol., U. Coll. Nairobi, Kenya) and P. Nderito. *Brit J Cancer* 22(3):563-568, 1968.

The development of tumors was studied in 240 rats fed flour *ad libitum* prepared from the starchy kernel of *Encephalartos hildebrandtii*, which is used in detoxified form as a human food in East Africa. The percentage of flour in the diet and the death rate at 6 months were as follows: 100% mortality at 20%, 73% at 10%, and 56% at 5%. Necropsy showed that neoplasms had developed in the liver (hepatocellular carcinomas, fibrosarcomas, cystadenomas, and bile duct adenomas, occasionally occurring simultaneously in the same liver), kidneys (fibrosarcomas with a few cystic or noncystic adenomas) and lungs (adenomas). The toxic and carcinogenic factors in this plant have not been identified but they may well be the same as those found in *Cycas circinalis.*

5438 STUDIES OF LIVER GLYCOGENOSES, WITH PARTICULAR REFERENCE TO THE METABOLISM OF INTRAVENOUSLY ADMINISTERED GLYCEROL.

(E.) Senior, B. (Tufts U. Sch. Med., Boston, Mass.) and L. Loridan. *New Eng J Med* 279(18):958-965, 1968.

The disposal rate of i.v. glycerol (120 mM/m^2 body surface area) and its effect on blood glucose and lactate levels were studied in 8 children with glycogen storage disease (6 boys and 2 girls, 2-15 yr old) and 22 controls (9 adults and 13 children) in order to evaluate the efficacy of gluconeogenetic pathways and clarify the mechanism of glycogen accumulation in the presence of hereditary enzyme deficiencies. The liver glycogen in these patients ranged from 6.2 to 11.7 g% and the maximal increase in blood glucose following glucagon or epinephrine was 0-23 mg% in 6 children and 48-88 mg% in 2,others (those with phosphorylase deficiency). The half-time for glycerol disposal was only 10.6 min in the 4 children with glucose-6-phosphatase deficiency and 18.2 min in one with a deficiency of amylo-1,6-glucosidase, compared to 23.6 min in the 2 with phosphorylase deficiency and 39.3 min in controls. Elevation of blood glucose was less than normal in the children lacking glucose-6-phosphatase and more than normal, but with distinctive patterns, in those lacking phosphorylase or amylo-1,6-glucosidase. Lactate levels were elevated following glycerol only in the children lacking glucose-6-phosphatase. One infant with a normal glucose-6-phosphatase activity in the liver on *in vitro* assay nevertheless showed responses similar to those in the 4 children with glucose-6-phosphatase deficiency (elevation of lactate and a marked drop in blood glucose after glycerol). This condition is proposed to be a variant of von Gierke's disease in which the glucose-6-phosphatase is inactive *in vivo.*

5439 FUNCTIONAL DIFFERENTIATION OF GLYCOGENOSES OF THE LIVER WITH RESPECT TO THE USE OF GLYCEROL. *(E.)*

Senior, B. (Tufts U. Sch. Med., Boston, Mass.) and L. Loridan. *New Eng J Med* 279(18):965-970, 1968.

In an effort to improve the differential diagnosis of hepatic glycogenosis, the effects of oral glycerol (260 mM/m^2 body surface area) on blood glucose and lactate, together with the response to epinephrine and glucagon, were correlated with liver enzyme levels in 7 children with glycogen storage disease (6 boys and 1 girl, 2-8 yr old) and 2 normal adult volunteers. In the normal subjects, oral glycerol was followed by a rapid increase in blood glucose and glycerol, while in the patients the effects on blood glucose were qualitatively similar to those previously observed after i.v. glycerol. The precise pattern of response, however, appeared to depend on the degree of initial extraction of glycerol by the liver, a factor which is obviated when the glycerol is administered i.v. The 4 children with glucose-6-phosphatase deficiency (3 confirmed *in vitro* and 1 "functional") had elevated lactate levels and little rise in blood glucose in response to either glycerol or epinephrine. The one patient with amylo-1,6-glucosidase deficiency and the 2 with a functional phosphorylase deficiency showed normal lactate levels and enhanced elevations of blood glucose following oral glycerol. However, the patient lacking amylo-1,6-glucosidase showed little response to glucagon whereas the response of the 2 believed to be deficient in phosphorylase was normal. It is pointed out that liver biopsy initially showed normal enzyme levels in 2 of these children (1 with a functional phosphorylase deficiency and 1 with glucose-6-phosphatase deficiency) and glucose-6-phosphatase deficiency instead of amylo-1,6-glucosidase deficiency in a 3rd, so that functional tests of this type may have greater clinical value for the differentiation of the glycogenoses than *in vitro* enzyme assays.

5440 A RADIOLOGICAL STUDY OF THE LYMPHATICS OF THE LIVER. *(E).*

Clain, D. (Royal Free Hosp., London, England) and J. McNulty. *Brit J Radiol* 41(489):662-668, 1968.

To determine the role or vascular obstruction and inflammation in the production of lymph in the liver, contrast material was injected into the liver parenchyma in 36 patients with acute and chronic liver disease and the rate and route of flow were observed by X-ray. Lymphatics were shown radiologically in cryptogenic and biliary cirrhosis, infectious hepatitis, acute hepatic venous occlusion, thrombosis of the hepatic veins, sarcoidosis, and carcinoma of the hepatic duct. Lymphatic drainage was not demonstrated by this method in normal livers nor in obstructive jaundice due to pancreatic neoplasm or drugs. Lymphatics were not prominent in long-standing hepatic venous obstruction, but profuse lymph flow followed acute occlusion of a hepatic vein. Inflammation and obstruction to the hepatic outflow tract are discussed as causes of the increased lymph flow which is shown by this technique. In 5 patients, the investigation provided information of diagnostic value.

5441 CYTOPLASMIC HYALINE INCLUSIONS IN HEPATOMA: HISTOCHEMICAL STUDY. *(E.)*

Norkin, S. A. (Women's Med. Coll. Pennsylvania, Philadelphia) and D. Campagna-Pinto. *Arch Path* 86(1):25-32, 1968.

When hepatocellular carcinomas taken at autopsy from 81 cases were examined microscopically, eosinophilic cytoplasmic inclusions were detected in 23 cases; these inclusions were of 2 types: 1) a reticular variety, morphologically similar to the Mallory body, and 2) large, sharply circumscribed, round or oval, eosinophilic globular bodies. Histochemical studies demonstrated that the reticular variety of neoplastic hyaline is indistinguishable from the Mallory body. The globular hyaline was shown to be composed of a basic protein somewhat similar to that of reticular hyaline, but to be totally devoid of a lipid component and staining positive to PAS.

5442 EXPERIMENTAL HEPATITIS INDUCED BY D-GALACTOSAMINE. *(E.)*

Keppler, D. (Inst. Biochem., U. Freiburg, Germany), R. Lesch, W. Reutter and K. Decker. *Exp Molec Path* 9(2):279-290, 1968.

Within 24-48 hr after the 1st of 6 i.p. injections of D-galactosamine (250 mg/kg in 0.45 M solution at 1-4 hr intervals), the livers of male and female Wistar rats showed alterations that closely resembled human viral hepatitis. Histologic changes included necrosis and inflammatory infiltration of periportal areas, mitoses and cell proliferation, the appearance of Councilman bodies, and an increased number of Kupffer cells. Serum levels of transaminases, glutamic dehydrogenase and other enzymes were greatly increased while the total serum protein, including prothrombin, was reduced. No fatty infiltration of the liver was seen, but liver glycogen was rapidly depleted. The levels of several metabolites in the liver, including adenine nucleotides and uridine diphosphoglucose, were significantly reduced. The ATP/ADP and lactate/pyruvate ratios remained within the normal range. These effects of galactosamine were dose dependent and could also be produced in other animals (guinea pigs, rabbits), although differences in quantitative response were noted and mice were relatively resistant. Several chemically related compounds failed to produce similar effects, indicating a high specificity of D-galactosamine. It is concluded that galactosamine hepatitis may serve as a biochemical and pathologic model of human viral hepatitis.

5443 INVOLVEMENT OF THE LIVER IN AMEBIASIS: PATHOANATOMICAL, CLINICAL AND SURGICAL CONSIDERATIONS IN A SERIES OF CASES OBSERVED IN A TROPICAL ENVIRONMENT. *(It.)*

Ferrari, M. (Inst. Surg. Path., U. Rome, Italy) and V. Beltrami. *Ann Ital Chir* 64(3):430-440, 1968.

Among approximately 120 cases of amebiasis encountered in Northwestern Nigeria, 33 (20 men and 13 women, 20-44 yr old, with a 6-8 month history of dysentery) were found to have hepatic involvement. In 14 of these (8 men and 6 women) this was limited to "presuppurative hepatitis" which could be treated medically using emetine, ambramycin and large doses of liver extracts; all 14 patients recovered in about 2 weeks. The other 19 (12 men and 7 women) had amebic liver abscesses, 11 of which had progressed to the stage of rupture. All 19 were treated surgically supplemented by amebicidal drugs, antibiotics, vitamins and restoration of water and electrolyte balance. There were 16 cures and 3 deaths (1 due to renal failure 7 days after elective surgery for an intrahepatic abscess and 2 following emergency surgery for ruptured abscess). On the basis of this experience and a review of the literature, it is concluded that hepatic amebiasis is a progressive disease which develops from the presuppurative stage to that of a ruptured abscess at a rate depending on individual conditions. Effective treatment at as early a stage as possible is essential to reduce the mortality rate below the usual 25%.

5444 IRON METABOLISM AND INTESTINAL ABSORPTION OF IRON IN PATIENTS WITH HEPATIC DISEASE. *(Ger.)*

Rommel, K. (Ctr. Int. Med., U. Ulm, Germany), E, Gladtke, G. Mähr, K. Grimmel and H. Burkhardt. *Schweiz Med Wschr* 98(47):1854-1859, 1968.

Nonradioactive iron absorption and turnover studies, using doses of 0.7 mg/kg p.o. and 70 μg/kg i.v., respectively, were carried out in 19 nonanemic subjects, including 5 healthy controls, 6 patients (5 men and 1 woman, 39-50 yr old) with cirrhosis of the liver (3 of whom showed hepatic iron deposits), 4 patients (1 man and 3 women, 42-64 yr old) with chronic hepatitis, 2 men (53-66 yr old) with porphyria cutanea tarda complicated by hepatitis or cirrhosis, and 2 men (53-58 yr old) with primary siderophilia, hepatitis and cirrhosis. All the patients with liver diseases showed increased turnover and accelerated elimination of i.v. iron, along with an inconsistent tendency toward increased iron absorption. Thus, the turnover rate averaged 31.7 μg/kg/hr in normal controls, 146.87 in patients with cirrhosis (only a slight increase in 2 of the 6), 89.61 in patients with chronic hepatitis (only a slight increase in 2 and a decrease to 8.35 in 1), 42.8-98.5 in patients with porphyria, and 69.7-277.0 in patients with siderosis. The clearance rate generally paralleled the turnover rate, averaging 23.7 ml/min in normal controls, 98.57 in cirrhosis, 54.72 in chronic hepatitis, 47.8 in porphyria and 86.7 in siderosis. The percent absorption of the oral dose averaged 20.68 in normal controls, 34.53 in patients with cirrhosis (being increased in 3 and decreased to only 2% in 1), 32.8 in patients with chronic hepatitis (being decreased to 2.2-4.0% in 2), 5.2-8.4% in porphyria, and 1.9-36.0% in siderosis. The relative distribution volume for iron was 0.036 ml/g body weight in normal controls and 0.051 ml/g in the patients, a difference which is not statistically significant. The results suggest that there are periodic fluctuations in iron turnover during the course of hepatic diseases.

5445 EFFECT OF STORAGE TEMPERATURE ON THE ELECTROMETRIC SURFACE HYDROGEN ION ACTIVITY OF ISCHEMIC LIVER AND HEART. *(E.)*

Couch, N. P. (Harvard Med. Sch., Boston, Mass.) and M. K. Middleton. *Surgery* 64(6):1099-1105, 1968.

Liver and cardiac tissue from New Zealand rabbits were used to determine the effect of storage temperature on surface pH during ischemia. Hydrogen ion activity was continuously monitored for a 30-min control period with an intact blood supply by means of pH and thermocouple electrodes, without tissue trauma. The right liver lobe and the heart were then excised and sealed in glass test tubes, and pH was recorded with surface electrodes, during different levels of cooling. After reaching a selected temperature level (5, 15, 22 or 30C) the organ was rewarmed to 38C. The degree of acidosis was found to be inversely proportional to the temperature during the cooling interval. Increases in surface hydrogen ion activity were greater during the first hour of ischemia than during subsequent periods, indicating a greater capacity for anaerobic glycolysis during the early phase of ischemia. The capacity for a further increase in hydrogen ion activity during the rewarming period was greatest in the organs subjected to the lowest temperatures. This rapid, simple and atraumatic technique offers a means for monitoring a fundamental metabolic event is ischemic tissue, such as anaerobic glycolysis and lactic acid production. Phosphoric, carbonic and fatty acids probably also contribute to the surface acidosis.

5446 **TYPES OF INFLAMMATORY RESPONSE IN THE LIVERS OF INFANTS (OBSERVATIONS ON CIRRHOSIS OF THE LIVER IN EARLY CHILDHOOD).** *(Ger.)* Seeliger, H. (Inst. Path., U. Saar, Homburg, Germany). *Virchow Arch Path Anat* 344(4):295-306, 1968.

The pathogenesis of childhood and infantile cirrhosis and the question of the intrauterine or postnatal onset of inflammatory changes in the liver are discussed on the basis of autopsy findings in 6 cases: 2 2-month-old girls in whom idiopathic cirrhosis must have begun during fetal development, a 6-month-old girl with early postnatal cirrhosis, 2 male infants (4 weeks and 13 months, resp.) with cirrhosis complicating glycogen-storage disease, and a 2.5-yr-old boy with childhood cirrhosis which more nearly resembled the adult form. Among the etiological factors which may play a role in infantile cirrhosis are hemolytic disease of the newborn, viral hepatitis, malformations of the the extra- and intrahepatic bile ducts, cholangiolitis, protein deficiency, metabolic disorders, cystic fibrosis, and syphilis. The manner in which the liver reacts to a particular noxious stimulus depends, however, on the morphological and functional maturity of the organ. In the first 2 cases mentioned above, intrauterine onset was proven by the absence of the normal radial orientation of the parenchymal plates with respect to the central veins. In these 2 cases and the 3rd case, the response was primarily histiocytic and fibrillar, corresponding to a phylogenetically ' 'young" reaction, while the phylogentically "older" forms of round-cell or lymphocytic infiltration were rare. The lack of specificity of the fibrohistiocytic response is shown, however, by the similar findings in 2 cases of glycogen-storage disease. In the 6th case, the periportal fields showed round-cell infiltration typical of adult cirrhosis, but there was also sclerosis and reticular fibrosis of the intermediary and central areas. The spectrum of possible inflammatory responses of the fetal and neonatal liver is thus conditioned by the evolutionary maturation occurring during ontogenesis. In turn, hepatic maturation itself can be impaired by prenatal or neonatal inflammation.

5447 **AN ELECTRON-MICROSCOPIC STUDY OF ALCOHOLIC HEPATITIS.** *(Fr.)* Oudea, P. (U. Hosp. Ctr., Nantes, France), G. Feldmann and M. C. Domart-Oudea. *Rev Int Hepat* 18(2):155-170, 1968.

Comparative electron-microscopic findings are presented for liver biopsies taken from 13 patients with subacute alcoholic hepatitis and signs of cytolysis (elevated serum transaminase levels), 3 patients with subacute alcoholic hepatitis and no elevation of serum transaminase, and 7 patients with subacute alcoholic hepatitis and intralobular fibrosis (cirrhotogenic hepatitis). Significant steatosis (fat droplets in over 20% of the cells), large numbers of giant mitochondria, significant swelling of the cisternae, and an appreciable number of cytolysomes were seen in 10, 7, 2 and 2, resp., of the first group of 13 patients. The findings in the next 3 patients were essentially the same, indicating that giant mitochondria and reticular anomalies do not necessarily result in elevated serum transaminase levels. Among the last 7 patients, all of whom had hepatomegaly and delayed BSP clearance, 2 of whom had frank jaundice, and 5 of whom had hypoalbuminemia, all had significant steatosis, 3 had large numbers of giant mitochondria (and all had some giant mitochondria), 3 had significant swelling of the cisternae, 5 had an appreciable number of cytolysomes, and 3 showed widespread fibrillar degeneration. One month after withdrawal of alcohol, in the 2 patients re-examined, the steatosis had decreased considerably but the other abnormalities remained the same. All 3 stages of subacute alcoholic hepatitis were thus characterized by an association of steatosis and mitochondrial, reticular and cytoplasmic anomalies in varying proportions, with a progressive increase in the number of hepatocytes involved. This paralleled the progressive deterioration of hepatic function in these patients. It is not yet clear, however, whether the lesions described culminate in the destruction of the hepatocytes and their replacement by fibrotic tissue, or whether this requires the intervention of fibrillar degeneration. The biochemical abnormalities underlying these ultrastructural changes are also still unknown.

5448 **A HISTOLOGICAL STUDY OF ACUTE AND SUBACUTE ALCOHOLIC HEPATITIS AND THEIR CONSEQUENCES.** *(Fr.)* Thaler, H. (Whilhelminen Hosp., Vienna, Austria). *Rev Int Hepat* 18(2):171-177, 1968.

Puncture biopsy of the liver in 792 cases of hepatic steatosis revealed 147 cases of steatotic hepatitis, including 133 in which the hepatitis could be ascribed to alcoholism, 12 due to diabetes, and 2 due to obesity. In most cases, the disease was slow in onset, with a gradual increase in liver size and development of abnormal liver function tests. In 20 patients, however, the process had reached the stage of cirrhosis, while 13 had extensive areas of centrilobular necrosis such as are usually seen only in acute viral hepatitis and 3 had diffuse parenchymal necrosis. It is concluded that steatotic hepatitis can progress in 3 ways: via a chronic course characterized by gradual destruction of the lobular architecture due to scar formation, formation of Mallory bodies, and recurrent focal necrosis; or via an acute necrotic process which can be either centrilobular or diffuse. The hepatitis is independent of the degree of fatty infiltration, even though it seems to be brought on by the same factors.

5449 **THE HISTOLOGY, ULTRASTRUCTURE AND HISTOBIOLOGY OF SUBACUTE AND CIRRHOTOGENIC ALCOHOLIC HEPATITIS.** *(Fr.)* Albot, G.

(Gastroent. Ctr., Hotel-Dieu, Paris, France), M. Parturier-Albot and P. Nicolescu. *Rev Int Hepat* 18(2):117-154, 1968.

The ultrastructural and histological abnormalities seen in the liver in subacute alcoholic hepatitis are described on the basis of a detailed study of 82 patients with steatotic, clear-cell or cirrhotogenic subacute alcoholic hepatitis and latent cirrhosis, including 36 cases of subacute alcoholic hepatitis studied by electron microscopy. The principal abnormalities seen in these cases involved the ergastoplasm, the agranular endoplasmic reticulum, the ribosomes, various cytoplasmic inclusions, and the mitochondria, all of which are affected to varying degrees in the various types of subacute alcoholic hepatitis. In addition to to these abnormalities and the varying degrees of steatosis, most of which have been described before, particular attention is given to anomalies affecting the intercellular membranes and the sanguineous and biliary poles of the hepatocytes. Thus, the intercellular membranes tend to be scattered and separated by a space filled with differentiating microvillosities. The sanguineous pole often shows an absence of endothelial cells or scattered disorganized microvillosities, while the space of Disse often shows lacunae, lacking microvillosities, which may be filled with granular material. At the biliary pole, the anomalies are less regular and pronounced, but may include enlargement of the biliary canaliculi, vacuolization or hyperplasia of the Golgi zones, and anomalies of Hering's transition zones. In a preliminary attempt to correlate the ultrastructural findings with the results of biological tests, it was noted that BSP retention was associated with marked vacuolization of the Golgi zones, while unusually rapid BSP celearance was associated with hyperplasia of these zones.

5450 THE EFFECT OF HORMONES ON DYE SECRETION BY THE LIVER. *(Ger.)* Skaunic, V. (1st Med. Clin., Charles U., Hradec Kralove, Czechoslovakia), V. Nerad and J. Skaunicova. *Acta Hepatosplen* 15(5):322-326,

The 30-min BSP retention, the relative storage capacity for BSP, and the secretory transport maximum of the liver for BSP were determined in 30 healthy men (53-67 yr old), 20 of whom had received either progesterone (10 mg/day), estradiol dipropionate (5 mg/day), hydrocortisone (50 mg/day) or testosterone propionate (25 mg/day) i.m. for 6 days. The average value for the 30-min BSP retention was decreased from 7.0% in controls to 4.3 after progresterone, 4.2 after estradiol, 6.4 after hydrocortisone, and 5.6 after testosterone, none of which were significant changes. The relative storage capacity was decreased from 40.0 controls to 26.5, 31.3 and 25.5 after progesterone, estradiol and testosterone, resp., and was increased to 43.4 after hydrocortisone. The secretory transport maximum was increased from 8.5 in controls to 10.4, 10.1 and 9.0 after progesterone, estradiol and hydrocortisone, resp., and decreased to 8.0 after testosterone. The only significant change noted ($p = 0.05$) was the drop in relative storage capacity after testosterone. The explanation for this finding remains unclear, and it is emphasized that these generally negative results do not rule out the possibility that liver dye secretion is affected by changes in endocrine status during aging.

5451 FUNCTION AND MORPHOLOGY OF THE LIVER FOLLOWING END-TO-SIDE PORTACAVAL SHUNT IN THE DOG. *(Ger.)* Brunner, L. (Surg. Clin., U. Göttingen, Germany), J. Dallmann, H. Emmermann, H. E. Hoffmeister and U. Schreiner. *Acta Hepatosplen* 15(5): 338-344, 1968.

In 12 normal dogs of both sexes, the creation of functional end-to-side portacaval shunts which directed all of the portal-vein blood into the vena cava was followed by progressive alterations in liver function lasting about 4 weeks. The dogs survived for an average of 165 days. The serum bilirubin rose rapidly after the operation to 0.51 mg% (0.12 mg% preoperatively), due to surgical and anesthetic trauma and the temporary ligation of the portal vein, but then slowly decreased to 0.11 mg% by the end of the 5th week. The BSP retention also rose to a peak immediately following the operation, with a residual elevation due to the persistent decrease in blood flow. The serum transaminase levels remained high for several weeks postoperatively, while the serum cholinesterase dropped sharply and then fluctuated below normal levels. There was no change in serum lability or plasma protein composition. Histological studies of the liver at the end of the experiment revealed trabecular atrophy of the liver cells, but no fatty infiltration. The changes in liver function are ascribed mostly to the 70% reduction in hepatic blood flow and 50% reduction in oxygen supply following creation of the portacaval shunt. Normalization of liver function follows compensation of the loss of portal flow by increased arterial supply.

5452 ON THE PATHOGENESIS OF THE HEPATOSPLENOMEGALY IN CHRONIC IRON DEFICIENCY ANAEMIA: A STUDY IN FIVE PATIENTS WITH A SYNDROME OF CHRONIC IRON DEFICIENCY ANAEMIA, HEPATOSPLENOMEGALY, HYPOGONADISM AND DWARFISM. *(E.)* Aksoy, M. (Vakif Guraba Hosp., Istanbul, Turkey), S. Erdem and G. Baserer. *Acta Hepatosplen* 15(4): 241-251, 1968.

Detailed case reports are presented for 5 patients (3 males and 2 females, 13-25 yr old) with a syndrome characterized by severe hypochromic microcytic anemia due to iron deficiency, marked hepatosplenomegaly or splenomegaly, infantilism and hypogonadism. Four of these patients also showed hematological signs of secondary hypersplenism. During splenectomy, liver biopsies were obtained from these patients and all showed evidence of liver disease (fibrosis in 3 cases and cirrhosis in 1). Portal hypertension was noted in all 3 patients in whom the portal pressure was measured, and all 5 patients showed mild biochemical changes and clinical symptoms of latent or frank cirrhosis. Since one patient also had pellagra and another had malabsorption and kwashiorkor, the cirrhosis is tentatively ascribed to dietary protein deficiency. The spleens showed no evidence of extramedullary hematopoiesis. These observations indicate that portal hypertension due to cirrhosis, possibly brought on by protein deficiency, is responsible for the hepatosplenomegaly seen in some cases of chronic iron-deficiency anemia.

5453 ULTRASTRUCTURAL STUDY OF THE LIVER IN HEPATIC PORPHYRIA. *(E.)* Jean, G. (Inst. Spec. Med. Path., U. Milan, Italy), G. Lambertenghi and T. Ranzi. *J Clin Path* 21(4):501-507, 1968.

Liver biopsy specimens obtained from one patient with acute intermittent porphyria and 7 patients with porphyria cutanea tarda were compared by light and electron microscopy. In acute intermittent porphyria, electron microscopy revealed frequent hepatocytes with giant misshapen mitochondria containing filamentous material, extensive steatosis, lipofuscin granules, enlarged perisinusoidal recesses and Disse spaces, hypertrophy of the endothelial and Kupffer cells, and abnormally small microvilli at the vascular poles. However, none of these changes could be considered specific for porphyria. All 7 patients with porphyria cutanea tarda showed steatosis, grade C siderosis (hemosiderin granules, either free or in macrophages, in the Kupffer cells, hepatocytes and portal tracts), and hyperplasia or hypertrophy of the endothelial and Kupffer cells with marked phagocytic activity; fibrosis was seen in 4 cases, cirrhosis in 3, and one showed the giant mitochondria encountered in acute intermittent porphyria. Primary lysosomes were consistently absent, indicating either that increased storage materials and the absence of primary lysosomes are the basic characteristics of porphyria cutanea tarda, or that the primary lysosomes had fused with the storage granules. Since the lysosomes are not involved in porphyrin metabolism, the second possibility is considered to be more likely.

5454 **EFFECT OF RENAL AND HEPATIC DISEASE ON VITAMIN-B$_{12}$ METABOLISM.** *(E.)* Adams, J. F. (Southern Gen. Hosp., Glasgow, Scotland) and K. Boddy. *Lancet* 2(7563):328-329, 1968.

After i.v. administration of 0.1 μg (0.5 μC) of ^{58}Co-cobalamin, the daily loss of cobalamin was found to be abnormally high (0.267-0.536% per day) in 6 of 10 patients (1 man and 9 women, 49-85 yr old) with renal or liver disease (3 of 5 in each group). Although there may have been a causal relation between the disease state and the abnormality, the exact cause is unknown. The findings indicate that some patients with renal and hepatic disease require more cobalamin than healthy individuals to maintain a normal balance between intake and loss.

5455 **THE EFFECT OF SPLENOCAVAL SHUNT ON GASTRIC SECRETION AND LIVER FUNCTION AS COMPARED WITH OTHER SHUNTING PROCEDURES IN THE DOG.** *(E.)* Hayashi, K. (U. Washington Sch. Med., Seattle), M. J. Rheault, L. S. Semb and L. M. Nyhus. *Surgery* 64(6):1084-1091, 1968.

The relations between liver disease, portal venous shunting and gastric hypersecretion were studied in 9 healthy Heidenhain-pouch dogs subjected to either portacaval, mesentericocaval or splenocaval shunting in groups of 3. Gastric hypersecretion as reflected in 24-hr pouch collections occurred after all shunting procedures; the effect was most marked in the mesentericocaval shunt group and was relatively slight in animals with splenocaval shunts. All animals showed increased gastric secretion postoperatively after eating a standard meal, with the mesentericocaval shunt group again showing the largest increase. There was no difference between the experimental groups in their response to histamine injection in the pre- and postoperative period. Alterations were also noted in liver function and hepatic histology in the mesentericocaval and portacaval shunt animals; all showed varying degrees of hepatic degeneration, characterized by atrophy, lobular morphological distortion, hepatocyte nuclear pyknosis, lack of mitochondria, and vacuolar fatty metamorphosis. Congestion and hemosiderosis were observed in the lobules of the portacaval and mesentericocaval shunt groups. Animals with splenocaval shunts showed no serious impairment in liver function or alterations in liver morphology; furthermore, they showed only a slight increase in gastric secretion, demonstrating that the hypersecretory mechanism is related primarily to events occurring in the small intestine and colon rather than in the proximal gut.

5456 **CHANGES IN THE DISTRIBUTION OF HEPATIC COPPER IN RELATION TO THE PROGRESSION OF WILSON'S DISEASE (HEPATOLENTICULAR DEGENERATION).** *(E.)* Goldfischer, S. (Albert Einstein Coll. Med., Bronx N. Y.) and I. Sternlieb. *Amer J Path* 53(6):883-901, 1968.

The localization of copper in the hepatocytes of 16 patients (9 males and 7 females, 3.5-51 yr of age) with Wilson's disease was compared with that in 4 premature infants who died of hyaline membrane disease at 25-30 weeks of gestation, 4 patient with postnecrotic cirrhosis, and 3 healthy adults using light and electron microscopy, rubeanic acid and silver sulfide staining techniques, and electron probe microanalysis. The hepatic Cu content was 241-1644 μg/g in the 16 patients and 210-381 μg/g in the newborns compared to 20-45 μg/g in controls. Serum ceruloplasmin levels were 1.0-8.4 mg% in the patients and 20-40 mg% in controls. Striking differences in staining patterns were observed at different stages of Wilson's disease. In the 7 youngest patients, who were asymptomatic, copper staining was diffuse in the cytoplasm. In slightly older patients, who exhibited early symptoms or signs of the disease, copper was both distributed diffusely in the hepatocytic cytoplasm and concentrated in lysosomes in different nodules. In the patients with advanced disease and in normal newborns, copper was found exclusively in the lysosomes. Diffuse copper staining was associated with pronounced cytopathologic changes in young patients. These changes were less marked or minimal in older patients in whom hepatic copper was concentrated in the lysosomes. The findings suggest that the sequestration of copper in lysosomes might protect the hepatocytes against the toxic effects of the metal.

5457 **ETHANOL CLEARANCE AND OXIDATION OF ETHANOL TO CARBON DIOXIDE IN PERSONS WITH AND WITHOUT LIVER DISEASE.** *(E.)* Clark, C. G. (Philadelphia Gen. Hosp., Pa.) and J. R. Senior. *Gastroenterology* 55(6):670-676, 1968.

An attempt was made to determine whether alcoholic individuals who develop liver fibrosis have a deficiency in ethanol metabolism. Ethanol oxidation in patients with liver disease has been observed in other studies to result in the accumulation of hepatic NADH, which might be expected to produce excessive formation of lactate from pyruvate. However, after a loading dose of 0.50-0.75 g/kg of ethanol p.o. or i.v., no difference in the increment of peripheral venous lactate levels or in the ethanol clearance rate was found between 5 patients (4 men and 1 woman, 24-59 yr old) with varying degrees of hepatic steatosis and 7 subjects without liver disease (6 men and 1 woman, 18-74 yr old). In seeking a more sensitive index of ethanol metabolism, the rate of formation of $^{14}CO_2$ from ethanol-1-^{14}C given i.v. after an oral ethanol load of 0.75 g/kg was determined. Again, on the basis of rate of $^{14}CO_2$ production from labeled ethanol, it was not possible to discriminate between 6 patients with liver disease and 4 subjects withou liver disease. It is concluded that no overall decrease in the rate of ethanol oxidation can be demonstrated in heavy users of alcohol who have evidence of liver disease, at least not when moderate doses of ethanol are given to hospitalized, adequately fed patients.

458 EXPERIMENTAL TECHNIQUES FOR AUXILIARY TRANSPLANTATION OF THE LIVER: SECTORIAL, TOTAL, AND IN COMBINATION WITH OTHER ORGANS. *(Fr.)* Dagradi, A. (Inst. Surg. Anat., U. Padua, Italy), G. P. Marzoli, A. Gamba, P. Fusaroli, M. Zannini and S. Radin. *Helv Chir Acta* 35(1/2):309-320, 1968.

459 REPORT OF A HUMAN CASE OF HEPATIC FASCIOLIASIS. *(Por.)* Mattar, F°, J. A. (Fac. Med., U. São Paulo, Brazil) and A. D. F. Amaral. *Folia Clin Biol* 36(1):56-67, 1967.

460 AN ELECTRON-MICROSCOPIC STUDY OF THE PATHOLOGICAL REACTIONS OF HEPATIC TISSUE. *(Ger.)* Hubner, G. (Inst. Path., U. Cologne, Germany). *Veroeff Morph Path* 78 (Suppl.):1-175, 1968.

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5466 LIVER REACTION AS MANIFESTED IN INCREASED ACTIVITY OF ORNITHINE CARBAMOYL TRANSFERASE IN SERUM AFTER SHORT HEAVY EXERCISE AND PROLONGED EXERCISE IN MAN. *(E.)* Ahlborg, B. (Karolinska Hosp., Stockholm, Sweden) and J. Brohult. *Forsvarsmedicin* 4(3):133-140, 1968.

5467 PRIMARY CARCINOMA OF THE LIVER IN EAST PAKISTAN. *(E.)* Islam, N. (Inst. Postgrad. Med., Dacca, East Pakistan), H. Mahtab and A. K. A. Khan. *J Trop Med Hyg* 71(8):206-211, 1968.

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5484 **FINE STRUCTURE AND SURFACE ADENOSINETRIPHOSPHATASE ACTIVITY OF A HUMAN HEPATOMA.** *(E.)* Willis, E. J. (Middlesex Hos. Med. Sch., London, England). *Cancer* 22(5):1046-1052, 1968.

5485 **INDICATIONS AND RESULTS OF PERIARTERIAL HEPATIC NEURECTOMY IN HEPATITIC JAUNDICE.** *(Fr.)* Paris, J., Y. Salembier and A. Armand. *Lille Med* 13(6):652-665, 1968.

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5505 **THE ROLE OF CITRIC ACID CYCLE TURNOVER IN THE CONTROL OF HEME BIOSYNTHESIS.** *(E.)* Onisawa, J. (Fac. Med., U. Tokyo, Japan) and T. Kurumada. *Jap J Med* 7(2):96-98, 1968.

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5520 **THE RESULTS OF COMPARATIVE STUDIES OF PERIPHERAL AND HEPATIC HEMODYNAMICS IN PATIENTS WITH FATTY LIVER AND CIRRHOSIS.** *(Ger.)* Schmitt, W. (Med. Clin., U. Wurzburg, Germany) and L. Pippig. *Aktuel Gastroent* pp. 108-110. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5521 **STUDIES OF EXPERIMENTAL DISTURBANCES OF THE LYMPHATIC CIRCULATION.** *(Ger.)* Gerlach, U. (Med. Clin. Polyclin., U. Munster, Germany), W. Hiby, H. Themann and T. O. Zoltan. *Aktuel Gastroent* pp. 145-146. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5522 **THE FREQUENCY AND EXTENT OF DISTURBANCES IN EXOCRINE PANCREATIC FUNCTION IN PATIENTS WITH CHRONIC HEPATIC DISEASE.** *(Ger.)* Goebell, H. (Med. Clin., U. Marburg, Germany), C. Bode and G. A. Martini. *Aktuel Gastroent* pp. 358-360. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5523 **CONTRIBUTION ON ALLERGIC HEPATITIS.** *(E.)* Oda, M. (Fac. Med., Shinshu U., Japan), S. Furuta, A. Omori, T. Homma, T. Arai, H. Takayama, H. Takayama, M. Ichizyo, K. Chiba, S. Hanaoka, H. Hisano, T. Okayama, A. Nagata, T. Takahashi and M. Aizawa. *Med J Shinshu U* 12(2):85-92, 1968.

5524 **PHARMACOLOGIC AND GENETIC DETERMINANTS OF DISORDERED BILIRUBIN TRANSPORT AND METABOLISM IN THE LIVER.** *(E.)* Gartner, L. M. (Albert Einstein Coll. Med., New York City) and I. M. Arias. *Ann NY Acad Sci* 151(2):833-841, 1968.

5525 **CAUSES OF POSTOPERATIVE JAUNDICE.** *(E.)* Lester, R. (Boston U. Sch. Med., Mass). *Amer J Surg* 116(3):342-345, 1968.

See also abstract nos.: 4838,4843,4845,4846,4847,4848,5144

5526 THE ETIOLOGY OF LIVER NECROSIS IN RATS FOLLOWING ADMINISTRATION OF PROGESTERONE LATE IN PREGNANCY. *(E.)* Craig, J. M. (Boston Hosp. Women, Brookline, Mass.). *Lab Invest* 19(1): 49-54, 1968.

When pregnant Sprague-Dawley rats were given progesterone (10 mg/day s.c.) from day 15 through day 25 of gestation, and sacrificed from day 20 through day 26 of gestation, multilobular, multifocal, irregular paracentral areas of liver necrosis were first noted on day 22 (in 1 of 9 rats) and became more common on days 23-24 (14 of 28 rats) and day 25 (6 of 8 rats). Intrauterine fetal death and inflammation of the placental membranes showed a similar behavior, also increasing in frequency and severity from day 22 through day 26 of gestation. Since this prolongation of gestation was associated with massive intrauterine bacterial growth, involvement of the maternal sinusoids and maternal bacteremia, the liver necrosis, renal cortical necrosis and cardiac lesions seen in these animals are ascribed to intrauterine blood loss, endotoxin shock, and bacteremia caused by enteric microorganisms.

5527 LIVER NECROSIS INDUCED BY HOMOLOGOUS "ACUTE PHASE PROTEIN" IN RABBITS. *(E.)* Croxatto, H. D. (U. Hawaii Sch. Med., Honolulu), E. T. Nishimura, K. Yamada and Y. Hokama. *Arch Path* 86(4):383-389, 1968.

Albino rabbits given purified homologous Cx-reactive protein (CxRP) in the form of alternate weekly s.c. and i.v. injections for periods of 2-3 months showed varying degrees of hepatic lesions. Grossly, the lesions were characterized as pale yellow, focal, or irregularly diffuse, slightly elevated patches scattered throughout the liver. Histologically, the pronounced features were inflammation associated with focal necrosis and hemorrhage of hepatic lobules. Exudative cells of neutrophils, lymphocytes, and occasional plasma cells predominated in some foci, while in others the lesions were proliferative and characteristically granulomatous in appearance. Fluorescein-labelled antibody to rabbit γ-globulin and to rabbit C'_3 complement showed positive fluorescent staining confined to the lesions. Passive hemagglutination tests showed high levels of antibody to homologous CxRP in rabbits inoculated with CxRP. The implication of a possible immunologic mechanism for the development of the lesions is suggested although a direct hepatotoxic effect of CxRP cannot be ruled out.

5528 THE ROLE OF ANOXIA IN THE ETIOLOGY OF HEPATIC STEATOSIS: SUGGESTIONS FOR THERAPY. *(Fr.)* Bernard, A., M. Paget and P. Lamelin. *J Sci Med Lille* 86(5):341-350, 1968.

In experiments on rabbits, injection of ethanol (5-10 ml of a 2-5 g% solution) into the portal vein was followed by immediate retraction of the liver, an increase in portal venous pressure from 10 to 14 cm H_2O, and marked hepatic ischemia due to the combined effect of thoracic aspiration and interruption of splanchnic flow. Repeated liver biopsies during the next 96 hr revealed an initial heterogeneity in the hepatic circulation, with regional dilatation and constriction of the hepatic sinusoids, followed by the progressive disappearance of glycogen and its replacement by fat. After 4 days, however, the hepatic steatosis had again receded and the liver glycogen content had returned to normal. The development of hepatic steatosis is ascribed to 2 main mechanisms: the *in situ* transformation of alcohol into fatty acids, and the exaggerated biosynthesis of fatty acids via the Lynen-Vagelos pathway (from acetylcoenzyme A derived from glycogenolysis), both of which are stimulated by anaerobic conditions and the accumulation of reduced DPN and TPN. Based on a review of the literature, the authors suggest that hepatic ischemia and anoxia are also responsible for the clinical development of fatty liver in such conditions as chronic alcoholism, cirrhosis, obstructive jaundice, acute respiratory insufficiency, heart disease, hemorrhage, shock, Eck fistula, CO or H_2S poisoning, methemoglobinemia, infectious diseases, hepatitis, diabetes, amyloidosis, choline deficiency, and tetracycline toxicity. The development of hepatic steatosis can only be prevented by assuring the supply of oxygen to the liver; antibiotics, diuretics, antiinflammatory agents, spasmolytic drugs, blood transfusions, sympathectomy, O_2 therapy or even hyperbaric oxygenation are all helpful.

5529 THE EFFECTS OF ETHANOL ON GALACTOSE ELIMINATION IN RATS WITH NORMAL AND CHOLINE-DEFICIENT FATTY LIVERS. *(E.)* Salaspuro, M. P. (Res. Labs., State Alcohol Monopoly, Helsinki, Finland) and A. E. Salaspuro. *Scand J Clin Lab Invest* 22(1):49-53, 1968.

The inhibitory effect of ethanol on galactose oxidation and the influence of choline deficiency and dietary fat and carbohydrate on the rate of galactose breakdown, with and without ethanol, were determined in nephrectomized, male albino, Wistar rats, 6-8 weeks of age. The rats were given 4 different diets containing 490 mg casein, 31 mg cystine, 184 mg salt mixture, 400 mg Arachis oil, a vitamin mixture, and either 4, 30, or 50% fat for 40 days, choline (20 mg/day) being given to one group on a 50% diet. Ethanol induced almost total inhibition of galactose oxidation in normal rats, but no inhibition was observable in choline-deficient rats with but no inhibition was observable in choline-deficient rats with fatty livers. This result was independent of the fat and carbohydrate content of the low-protein, choline-deficient diet, but choline supplementation restored the normal inhibitory effect of ethanol. Unexpectedly, the rate of galactose oxidation without ethanol in choline-deficient rats was more than twice the rate in the normal or choline-supplemented groups.

5530 RAT SERUM LIPOPROTEINS AFTER PARTIAL HEPATECTOMY. *(E.)* Narayan, K. A. (Burnsides Res. Lab., U. Illinois, Urbana), G. E. S. Mary and F. A. Kummerow. *Proc Soc Exp Biol Med* 129(1):6-12, 1968.

Serum lipid, phospholipid and lipoprotein levels were determined by ultracentrifugal, disc-electrophoretic and chemical methods in 17 partially hepatectomized male rats, 16 sham operated rats and 12 nonoperated control rats. Determinations were made either 24, 48 and 72 hr after hepatectomy or 20 days after hepatectomy. The results indicated a sharp decline in serum high-density lipoproteins and an elevation in low-density lipoproteins during liver regeneration. The decrease in high-density lipoproteins in partially hepatectomized rats is probably due to their utilization by the liver during regeneration.

5531 ALCOHOLIC DRINKING HABIT AND HEPATIC DAMAGE. *(E.)* Viel, B. (Sch. Med., U. Chile, Santiago), S. Donoso, D. Salcedo and A. Varela. *J Chronic Dis* 21(3):157-166, 1968.

The macro- and microscopic morphology of the liver were correlated with the drinking habits of 1079 males and 269 females, randomly chosen, who died violent deaths during the period 1960-64. Autopsies were performed within 24 hr after death. Individuals ranged from 10 to 65 yr of age and were presumably in good health at the time of death. Data on the drinking habits were obtained from the nearest relative using a structured questionnaire. Six classifications based on the histological examination and 5 classifications based on the alcoholic drinking patterns were made, independently of each other, and correlated mathematically. Comparison of the results of the 2 classifications confirmed that: 1) alcoholic illness is more frequent in males than in females; 2) among alcoholics with normal hepatic architecture, there is a greater deposit of intracellular fat, independent of subcutaneous fat, which appears at an early age; and 3) acute or subacute fatty liver and Laennec's cirrhosis are significantly associated with alcohol abuse. No sex difference among the hepatic lesions was noted when similar drinking habits were compared.

5532 ENDOTOXIN AND THE LIVER. I. TOXICITY IN RATS WITH CHOLINE DEFICIENT FATTY LIVERS. *(E.)* Nolan, J. P. (State U. New York, Sch. Med., Buffalo) and M. V. Ali. *Proc Soc Exp Biol Med* 129(1):29-31, 1968.

Because previous reports have demonstrated that intestinal bacterial suppression retards the development of cirrhosis in rats on choline deficient diets, the sensitivity of female Holtzman rats to the lethal and sublethal effects of the *Escherichia coli* lipopolysaccharide endotoxin was studied. Rats with fatty livers due to dietary choline deficiency had a marked reduction in the LD_{50} to endotoxin. In addition, serum transaminase levels in these animals were raised by doses of the endotoxin that were too small to affect the enzyme levels in controls. It is suggested that rats on a choline-deficient cirrhotogenic diet experience tissue necrosis from amounts of endotoxin that are ordinarily rendered harmless.

5533 HEPATIC DYSFUNCTION ASSOCIATED WITH RENAL TRANSPLANTATION. *(E.)* Evans, D. B. (Addenbrooke's Hosp., Cambridge, England), P. R. Millard and B. M. Herbertson. *Lancet* 2(7575):929-934, 1968.

Details are presented for the 5 of 49 patients in end-stage renal failure, all of whom were treated by renal transplantation, who showed evidence of hepatic dysfunction before death. At various times during the postoperative period liver function tests, especially SGPT, were abnormal. In 3 patients the morphological changes found in the liver postmortem were thought to have contributed to death. The liver was enlarged in all patients. Microscopically, all the livers were abnormal with a variety of changes which included liver cell necrosis, liver cell pleomorphism, bile duct proliferation, and increase in portal-tract connective tissues. Virus cultures demonstrated inclusion bodies resembling those in cytomegalic inclusion disease in 4 patients, and cytomegalovirus was cultured from another patient. Hepatotoxic drugs and virus hepatitis were considered as possible etiological factors which led to the deaths of these patients. Azathioprine may possibly account for the histological and biochemical changes, but it is difficult to attribute all the chemical features in these 5 patients to this drug.

5534 FULMINANT HEPATIC FAILURE: PRESUMABLE CONTRIBUTION OF HALOTHANE. *(E.)* Trey, C. (Boston City Hosp., Mass.), L. Lipworth, T. C. Chalmers, C. S. Davidson, L. S. Gottlieb, H. Popper and S. J. Saunders. *New Eng J Med* 279(15):798-801, 1968.

Analysis of the first 150 cases collected from 73 centers reporting to the Fulminant Hepatic Failure Surveillance Study, including 142 who progressed to Stage IV hepatic coma, showed that 80 patients had presumable viral hepatitis, of whom 62 died. Of 41 patients who had had recent surgery, 36 died. In 35 patients massive liver necrosis developed less than 3 weeks after halothane anesthesia, and 27 of these had had multiple exposures to halothane. Thus, although the risk from halothane is small, this complication was present in nearly one quarter of the cases reported in this study. Postoperative fever after exposure to halothane, otherwise unexplained, is an important warning sign, and should be thoroughly investigated and taken into consideration when further exposure to this anesthetic is contemplated. All 12 patients in whom other drugs could be incriminated were in Stage IV coma and 6 survived. Of the latter, 2 had received p-aminosalicylic acid and the remaining 4 had received carbon tetrachloride, ethionamide, proethionamide, and chloramphenicol, resp. There were also 2 cases of "fatty liver of pregnancy," but in 20 cases the etiology of the hepatic failure remained unclear.

5535 THE EFFECTS OF CHRONIC ALCOHOL ADMINISTRATION ON ENZYME PROFILE AND GLYCERIDE CONTENT OF HEART MUSCLE, BRAIN AND LIVER. *(E.)* Marciniak, M. (Wayne State U. Sch. Med., Detroit, Mich.), S. Gudbjarnason and T. A. Bruce. *Proc Soc Exp Biol Med* 128(4):1021-1025, 1968.

The effect of chronic alcohol administration (400-600 ml 20% ethanol daily for 10 weeks) on the glyceride content and enzyme profile of heart muscle, brain, and liver tissue was compared in 24 mongrel dogs. The activities of the following enzymes were studied: aldolase, glyceraldehyde-phosphate dehydrogenase, lactic dehydrogenase, NAD- and NADP-specific isocitric dehydrogenase, malic dehydrogenase, glutamic-oxaloacetic transaminase, and glucose-6-phosphate dehydrogenase. A significant increase (2.8-fold) in the glyceride content of cardiac muscle was observed in the alcohol-consuming animal, without concomitant changes in myocardial enzyme profile. Chronic alcohol administration resulted in a significant increase in the activity of glycolytic and oxidative enzymes of the brain, but without parallel changes in the glyceride content of the brain. The administration of ethanol for 10 weeks resulted in a 3.5-fold increase in glyceride content and a significant increase in the activity of glycolytic and oxidative enzymes in the liver.

5536 VASODEPRESSIVE EFFECTS OF THE VENOUS EFFLUENT FOLLOWING CANINE LIVER

ALLOTRANSPLANTATION. *(E.)* Joseph, W. L. (UCLA Sch. Med., Los Angles, Calif.), E. W. Fonkalsrud and W. P. Longmire Jr. *J Surg Res* 8(8):367-372, 1968.

The venous effluent which pools in the transplanted liver immediately following revascularization was studied in 35 mongrel dogs in order to quantitate metabolic changes and isolate vasoactive substances which might induce systemic hypotension. Homotransplantation of the liver necessarily entails variable periods of hepatic anoxia. Hypoxia or direct hepatic trauma at the time of transplantation results in accumulation of toxic metabolites and the release of a vasoactive substance which is capable of producing profound and sustained hypotension. Only minor alterations in serum electrolytes, bilirubin, and alkaline phosphatase were noted in the venous effluent gathered from the revascularized liver graft. Serum transaminase levels were generally less elevated when the donor liver was perfused hypothermically and the duration of hepatic ischemia was short. Injection of the plasma fraction from the venous effluent of the revascularized liver graft, with exclusion of the dog's hepatic circulation, resulted in sustained hypotension. Acidotic effluent and bacteria in the effluent were not universally productive of hypotension. The formation of a vasoactive substance from disintegration of liver cells may be responsible for this hypotension. However, hypotension may be partially obviated by diversion of the accumulated blood in the newly vascularized transplanted liver for a protracted period of time before recirculation in the recipient is permitted.

5537 THE EFFECT OF CHRONIC CARBON TETRACHLORIDE INHALATION ON THE SECRETION OF LIPID BY RAT LIVER.

(E.) Kanics, L. (Dept. Biochem., McGill U., Montreal, Canada) and D. Rubinstein. *Biochem Pharmacol* 17(9):1959-1967, 1968.

The effect of chronic, daily, 8-hr exposures to 68 or 680 ppm CCl_4 on hepatic metabolism was studied in male hooded rats. After 6 days of exposure, there was an elevation in the SGOT and hepatic triglyceride levels and a decrease in hepatic glycogen. Intravenous administration of palmitate-^{14}C after 5 days of exposure (68 ppm CCl_4) revealed a decrease in the rate of release of labeled lipid from the liver when compared to that in control animals. This was reflected in a decrease in the amount of labeled triglycerides in the serum of the intoxicated animals. After exposure to 680 ppm for 5 days, leucine-1-^{14}C and palmitate-9,10-^{3}H were injected i.v. and the serum lipoprotein fraction was isolated. A significant decrease in the radioactivity of lipid and protein moieties in the low-density lipoproteins was noted. It is concluded that chronic inhalation of CCl_4 leads to an accumulation of hepatic triglycerides and inhibition of the secretion of low-density lipoproteins. The loss in glycogen is not due solely to increased glycogenolysis but also involves an inability to resynthesize liver glycogen (food consumption being equal in control and intoxicated rats).

5538 LIVER REGENERATION IN THE PRESENCE OF ANTITUMOR ANTIBIOTICS AND ANTIMETABOLITES.

(E.) Gershbein, L. L. (Northwest Inst. Med. Res., Chicago, Ill.) and A. F. Pedroso. *Acta Hepatosplen* 15(2):89-97, 1968.

Liver regeneration in partially hepatectomized rats was delayed by an average of 10.5 days by diets supplemented with the following on a weight basis: thio-TEPA (0.015%), triethylenemelamine (0.0020%), 6-mercaptopurine (0.020%), alloxan (0.20%) and 8-azaadenine (0.25%). The rate of regeneration was not significantly altered by various antimetabolites, including cyclophosphamide (0.030%), 2-n-heptyl-4-hydroxy-quinoline-N-oxide (0.0075%), hydroxyurea (0.15%), or methotrexate and aminopterin, each at 6.7 μg/g diet. Subcutaneous injection of hydroxyurea daily for 7 days (total dose 1550 mg/kg) or of 6-N-hydroxyaminopurine (233 mg/kg) proved ineffective; 8-azaguanine (126 mg/kg) produced inhibition, while liver regeneration was accelerated by 2,4-dithiopyrimidine (0.050%), 2-thiocytosine (0.25%) and 5-mercaptomethyluracil (0.075%). The inhibitory action of 6-mercaptopurine did not extend to 6-methylmercaptopurine (0.040%) or to 2,6-dimercaptopurine (0.035%). Of the antitumor antibiotics administered subcutaneously, azaserine, roseolic acid and cycloheximide inhibited liver regeneration at total dosages of 11.1, 0.076, and 1.25 mg/kg, respectively.

5539 HEPATOTOXICITY OF PHENOTHIAZINES *IN VITRO* AS MEASURED BY LOSS OF AMINOTRANSFERASES TO SURROUNDING MEDIA.

(E.) Dujovne, C. A. (George Washington U. Sch. Med., Washington, D. C.), R. Levy and H. J. Zimmerman. *Proc Soc Exp Biol Med* 128(2):561-563, 1968.

The *in virto* exposure of rabbit liver slices (50 mg) to 10^{-3}M chlorpromazine in Krebs-Ringer bicarbonate buffer (pH 6.7) at 37C (95% O_2/5% CO_2) led to appreciable leakage of aspartic aminotransferase and alanine aminotransferase into the surrounding medium. At equal concentrations, promazine did not lead to an identifiable degree of leakage of these enzymes into the medium. Patients receiving chlorpromazine develop a high incidence of mild hepatic dysfunction and a significant incidence of jaundice; promazine does not lead to hepatic dysfunction. The different *in vitro* effects of the 2 drugs thus parallel what is known about their potential hepatotoxic effect in humans.

5540 PHAGOCYTIC ACTIVITY IN EXPERIMENTAL LIVER INJURY.

(E.) Paumgartner, G. (VA Hosp., East Orange, N. J.), J. Longueville and C. M. Leevy. *Exp Molec Path* 9(2):161-170, 1968.

The relation between phagocytic capacity (clearance of colloidal carbon) and the morphologic and functional alterations of the liver in experimental hepatic injury was studied in 220 male Sprague-Dawley rats. A single dose of CCl_4 (0.2 ml/100 g body weight) was given intragastrically to produce hepatic injury, while in 40 rats cirrhosis was produced by administration of 0.1 ml/100 g 3 times weekly for 3 months. A significant increase in phagocytic capacity was noted at the height of the regenerative response which followed induced hepatic injury. Accelerated removal of colloidal carbon persisted until restoration of normal histologic findings and functions as reflected by resp. During maximum liver-cell necrosis, carbon deposition was increased in the liver and lung but decreased in the position was increased in the liver and lung but decreased in the spleen. The phagocytic activity of the acutely injured liver could not be related to circulatory factors. Patterns of colloidal carbon removal did not change when plasma obtained from animals at the period of maximum hepatic necrosis or regeneration was incubated with the test substances or injected prior to clearance studies. The results indicate that hepatic regeneration is accompanied by an increased capacity of the newly proliferating Kupffer cells to phagocytase colloidal carbon particles.

5541 QUANTITATIVE ASSESSMENT OF THE PERSISTENT ANTIMITOTIC EFFECT OF CERTAIN HEPATOTOXIC PYRROLIZIDINE ALKALOIDS ON RAT LIVER. *(E.)* Downing, D. T. (C. S. I. R. O., Div. Appl. Chem., Victoria, Australia) and J. E. Peterson. *Aust J Exp Biol Med Sci* 46(5):493-502, 1968.

Experiments in young male Wistar rats showed that the mitotic acceleration observed in liver cells after partial hepatectomy is inhibited by certain pyrrolizidine alkaloids given i.p. preoperatively. For example, injection of only 5% of the acute LD_{50} of heliotrine up to 8 weeks before a Higgins-Anderson type hepatectomy (67%) resulted in a 50% inhibition of mitosis as measured 8 hr after administration of colchicine (0.125 mg/100 g body weight). Heliotrine, lasiocarpine and lasiocarpine N-oxide given 4 weeks before surgery produced a maximal antimitotic effect when given in single doses greater than about 0.1 acute LD_{50}, and a graded response at lower dose levels. Heliotridine, 7-angelylheliotridine and platyphylline showed no significant activity. A bioassay procedure based on these findings is proposed, which is suitable for determination of the specific antimitotic activity of compounds capable of producing persistent inhibition of liver cell division.

5542 EARLY ONSET OF LIPOPEROXIDATION IN RAT LIVER AFTER CARBON TETRACHLORIDE ADMINISTRATION. *(E.)* Rao, K. S. (Sch. Med, Case Western Reserve U., Cleveland, Ohio) and R. O. Recknagel. *Exp Molec Path* 9(2):271-278, 1968.

Studies on sucrose homogenates prepared from the livers of fasted, male, Sprague-Dawley rats given a 1:1 mixture of CCl_4 (0.25 ml/100 g) in mineral oil by stomach tube under light ether anesthesia showed that the peroxidative decomposition of the microsomal lipids, as evidenced by the appearance of diene conjugation absorption, is more than half-maximal within 5 min after intragastric administration of carbon tetrachloride. The degenerative process was complete within 15 min in the microsomal fraction but was much slower for the mitochondrial lipids. This peroxidative decomposition of the microsomal lipids is the most rapid pathological alteration yet noted for CCl_4-induced liver damage under comparable conditions of dosage and route of administration. This finding supports the hypothesis that lipoperoxidation plays a role in carbon tetrachloride hepatotoxicity.

5543 STUDIES ON THE NATURE OF THE SUBSTANCE RESPONSIBLE FOR THE INHIBITION OF O-STREPTOLYSIN IN THE SERUM OF MICE WITH MHV-3 VIRAL HEPATITIS OR HEPATIC NECROSIS CAUSED BY CCl_4. *(It.)* Matano, F. (Infect. Dis. Clin., U. Naples, Italy), C. Pezzullo, G. Di Stasio, L. Cacciatore and G. Squame. *Riv Ist Sieroterap Ital* 43(2):59-63, 1968.

In 3-week-old Swiss albino mice, the O-antistreptolysin titer was increased from an average of 82.4 to 7083 U 48 hr after i.p. inoculation with 1000 LD_{50} of MHV-3 virus, and to 11041 U 36 hr after i.p. injection of CCl_4 (1.0 μl/g). After precipitation of the β-lipoproteins by the method of Burstein (*J. Physiol.* 49:83, 1957), however, the apparent antistreptolysin titers in the same animals fell to 126.1 and 105.4, resp. These results indicate that during hepatocellular necrosis of whatever etiology, a substance which precipitates together with the β-lipoproteins is released into the bloodstream. This substance is a nonspecific inhibitor of O-streptolysin and is thus responsible for the sharp rise in antistreptolysin titer seen during either viral hepatitis or CCl_4 poisoning.

5544 CHARACTERISTIC LESIONS OF METHYLAZOXYMETHANOL-INDUCED LIVER DAMAGE: A COMPARATIVE ULTRASTRUCTURAL STUDY WITH DIMETHYLNITROSAMINE, HYDRAZINE SULFATE, AND CARBON TETRACHLORIDE. *(E.)* Ganote, C. E. (Natl. Inst. Arthr. Metab. Dis., (NIH, Bethesda, Md.) and A. S. Rosenthal. *Lab Invest* 19(4):382-397, 1968.

The acute subcellular changes induced by methylazoxymethanol (60-110 mg/kg i.p.), dimethylnitrosamine (35-75 mg/kg i.p.), CCl_4 (0.25 ml/100 g i.p.) and hydrazine sulfate (260 mg/kg i.p.) were compared in male Osborne-Mendel rats. At equivalent dose levels and times, methylazoxymethanol and dimethylnitrosamine were found to produce similar and rather characteristic changes in liver ultrastructure. The most prominent lesions were segregation of nucleolar components with depletion of granular material, hypertrophy of the smooth endoplasmic reticulum, a decrease in the number of ribosomes, and formation of membrane whorls. The distinctive changes produced by CCl_4 included depletion and vesiculation of the rough endoplasmic reticulum, formation of clumps of tangled membranous material, and vacuolization of the Golgi apparatus. The only common changes produced by these 3 compounds were loss of polysomes and accumulation of fat. However, the ultrastructural changes produced by hydrazine (nuclear and nucleolar enlargement, prominent mitochondrial swelling, filling of the Golgi cisternae with lipid-like material, and apparent increases in microbodies) were entirely distinct from those produced by any of the 3 other toxins. It is concluded that hepatocellular changes produced by chemical toxins can be correlated directly with the known biochemical effects of these compounds.

5545 FINE STRUCTURAL CHANGES IN LIVERS OF DOGS IN ANAPHYLAXIS. *(E.)* Hampton, J. C. (Northwestern U. Med. Sch., Chicago, Ill.), R. Patterson and B. Rosario. *Exp Molec Path* 9(2):258-270, 1968.

Light and electron microscopy were used to study the changes occurring in the livers of sensitized dogs from 15 seconds to 20 min after the administration of the challenge antigen. Canine antiragweed serum obtained from a dog with severe, spontaneous ragweed allergy was used (10 ml) to sensitize 2 nonallergic normal dogs. Anaphylaxis was induced by i.v. injection of 1 ml of an aqueous extract of ragweed antigen 24 hr later, and pathologic changes in the liver were studied in serial biopsies. The findings demonstrated destruction of endothelial cells and hepatocytes as early as 15 seconds after the challenge dose. Later changes consisted of vacuolation of hepatocytes, continued cellular disruption, and filling of sinusoids by cell debris. These changes persisted throughout the period of observation.

5546 THE O-ANTISTREPTOLYSIN TITER IN THE SERUM OF RATS WITH EXPERIMENTAL CHOLESTASIS OR HEPATIC NECROSIS CAUSED BY CCl_4.

(It.) Di Stasio, G. (Infect. Dis. Clin., U. Naples, Italy), C. Pezzullo, F. Matano and L. Cacciatore. *Riv Ist Sieroterap Ital* 43(2):64-72, 1968.

In anesthetized Sprague-Dawley rats weighing 200-220 g, ligation of the common bile duct was followed by a parallel increase in O-antistreptolysin titer, serum transaminases and serum bilirubin during the first 12 hr; the serum transaminases and antistreptolysin titer remained at approximately the same level between 12 and 48 hr, after which they decreased slowly towards normal over the next 1-2 weeks, while the serum bilirubin continued to increase for at least 10 days. In another group of rats, i.p. administration of CCl_4 (1.3 ml/kg) was followed by a sharp increase in serum transaminases and O-antistreptolysin titer while the serum bilirubin remained normal. The increase in apparent antistreptolysin titer was eliminated in all serum samples by precipitation of the β-lipoproteins using the method of Burstein (*J Physiol* 49:83, 1957). The increase in antistreptolysin titer is therefore attributed to the combination of β-lipoproteins with substances released from the liver cell during necrosis, as well as with substances present in the bile. It should be noted that bile itself has no antistreptolysin titer.

5547 STUDIES ON THE COMBINED EFFECT OF CHLORPROMAZINE AND ETHANOL. *(Pol.)*

Molenda, R. (Dept. Legal Med., Acad. Med., Bialystok, Poland). *Roczn Akad Med Marchlewski* 12:93-107, 1967.

The possible synergistic effects of chlorpromazine and ethanol were investigated in 3 types of animal experiments designed to elucidate the effect of both agents (separately and together) on conditioned avoidance reflexes and the effect of chlorpromazine on the toxicity and metabolism of ethanol. In male white mice, for example, the LD_{50} of ethanol alone was 4700 mg/kg (range 4321-5123), but when chlorpromazine was given 1 hr earlier at doses equalling 25, 50 or 75% of the LD_{50} (50 100 or 150 mg/kg, respectively), the LD_{50} of ethanol was decreased to 3300, 3100 and 2900 mg/kg. In rats, whereas small doses of chlorpromazine (20 mg/kg) produced a temporary increase in the ethanol blood level following administration of 1400 mg/kg, without prolonging its elimination time (about 5 hr), toxic doses of chlorpromazine (100 mg/kg) increased both the blood level and the elimination time of ethanol. Following administration of 1800 mg/kg i.p., the elimination time was increased by chlorpromazine from 7 hr to 9-10 hr. These results may help to explain the potentiating effect of chlorpromazine on the toxicity and neuroplegic activity of ethanol when both are given in small doses.

5548 HYPERGAMMAGLOBULINEMIA IN EXPERIMENTAL LIVER INJURY. *(E.)*

Jabbari, M. (New Jersey Coll. Med., East Orange) and C. M. Leevy. *Proc Soc Exp Biol Med* 126(2):562-564, 1967.

The ability of the isolated perfused liver from normal rats and male Sprague-Dawley rats with CCl_4-induced cirrhosis (0.2 ml s.c. 3 times a week for 3-6 months) to synthesize γ-globulin was compared by studying the incorporation of ^{14}C-lysine into liver mesenchymal cells and plasma proteins. At monthly intervals during induction of cirrhosis, the incorporation of tritiated thymidine into hepatic nucleic acids was also investigated by an autoradiographic technique. Whereas the normal liver contained 30-40 labeled nuclei per 100,000 cells, cirrhotic livers showed 7,000-10,000 labeled nuclei per 10,000 cells. The ratio between labeled mesenchymal cells and liver cells was increased from 4:1 in controls to 8:1 or 12:1 in rats with cirrhosis, and the incorporation of ^{14}C-lysine into serum γ-globulin was 3 times as high in cirrhotic rat as in controls. During induction of cirrhosis, rats showed a progressive rise in serum γ-globulin levels and a decrease in serum albumin. It is concluded from these results that the hypergammaglobulinemia seen in active cirrhosis results, at least in part, from a persistent increase in the number of protein-synthesizing mesenchymal cells.

5549 HEPATIC LIPID PEROXIDATION IN ACUTE FATAL HUMAN CARBON TETRACHLORIDE POISONING. *(E.)*

Hashimoto, S. (Sch. Med., Case Western Reserve U., Cleveland, Ohio), E. A. Glende Jr. and R. O. Recknagel. *New Eng J Med* 279(20):1082-1085, 1968.

Experimental work with rats has shown that peroxidative decomposition of the structural lipids of the liver cell is an early result of acute CCl_4 poisoning. In order to determine whether this observation can be extended to man, chemical studies were performed on liver samples obtained at autopsy from a 48-yr-old woman who drank 500 ml of CCl_4 and a 66-yr-old woman with a normal liver who was killed in a traffic accident. The CCl_4-poisoned liver showed a marked increase in neutral lipids. Examination of the liver lipids for conjugated diene configuration indicated that CCl_4 had induced extensive peroxidative degeneration. Based on the absence of lipid peroxidation during an experimental study of thioacetamide hepatotoxicity (40 mg/100 g p.o.) and postmortem autolysis in rats, it appeared highly unlikely that the observed lipid peroxidation after CCl_4 could have been due to either nonspecific necrobiologic changes or postmortem autolysis. It is concluded that acute CCl_4 poisoning produces a peroxidative degeneration of liver-cell structural lipids in both man and experimental animals.

5550 THROMBOCYTOPENIA IN ALCOHOLICS. *(E.)*

Lindenbaum, J. (Columbia U. Coll. Phys. Surg., New York City) and R. L. Hargrove. *Ann Intern Med* 68(3):526-532, 1968.

Ten episodes of thrombocytopenia were observed in 5 chronic alcoholics with delirium tremens (4 men and 1 woman, 40-57 yr old). All 5 patients had low platelet levels at the time of admission in the absence of cirrhosis, splenomegaly, or evidence of folic acid deficiency. All had mild-moderate hepatomegaly which receded in 2-3 weeks after admission and 2 of 4 examined had hepatic steatosis, but the liver function tests were essentially normal. The platelet count rapidly returned to normal in all cases within a few days of admission and there was a subsequent thrombocytosis which disappeared in about 2 weeks. Bleeding manifestations seen in some of the patients included multiple ecchymoses on the trunk and extremities, occult blood in the stools, and a hemorrhagic cerebrospinal fluid. Thrombocytopenia was found to recur after resumption of ethanol intake. Low platelet counts (68,000-138,000/mm^3)

were also found in 5 of 36 consecutive alcoholics examined during a 2-month period, and in 9 of the 31 with normal platelet counts, these rose further after withdrawal from alcohol. It is suggested that the thrombocytopenia observed in alcoholics is the result of a direct toxic effect of alcohol on the platelets.

5551 SECRETION OF TRIGLYCERIDE BY THE LIVER AFTER PARTIAL HEPATECTOMY.

(E.) Fex, G. (Dept. Physiol. Chem., U. Umeå, Sweden) and T. Olivecrona. *Biochim Biophys Acta* 164(2):424-426, 1968.

To determine the role of decreased liver lipid secretion in liver triglyceride accumulation after partial hepatectomy, the livers of fasted male Sprague-Dawley rats (180-240 g) were studied with and without administration of Triton. The group was divided into nonoperated controls, laparotomized controls, and partially hepatectomized animals. Triton-induced hyperlipemia was greater in hepatectomized rats than in laparotomized controls at 3 hr, similar at 8 hr, and lower at 24 hr. The ability of the liver to secrete triglycerides was not decreased during the period when rapid fat accumulation occurred in the liver. When hyperlipemia was related to liver size, the response of partially hepatectomized rats was almost 3 times that in the laparotomized controls at 3 and 8 hr. It is proposed that the partially resected liver takes up and esterifies more plasma-free fatty acids per gram of tissue, leading to increased synthesis and release of very low density lipoproteins.

5552 A COMPARISON OF THE CHRONIC EFFECTS OF IRRADIATION UPON THE NORMAL, DAMAGED, AND REGENERATING RAT LIVER. *(E.)*

Dettmer, C. M. (Jefferson Med. Coll. Hosp., Philadelphia, Pa.), S. Kramer, D. H. Driscoll and G. E. Aponte. *Radiology* 91(5): 993-997, 1968.

The long-term effects of irradiation on the normal, damaged, and regenerating liver were studied in female CFN rats (200 g body weight) on the basis of 4 main parameters: mortality, body weight changes, liver function as measured by ^{131}I-Rose Bengal uptake, and histologic abnormalities. A single dose of either 1000 or 2500 rads was delivered to the whole liver and the animals were followed for 1 yr. Two groups of rats were subjected either to s.c. injection of CCl_4 (0.7 cc) or partial hepatectomy (67%), 24 and 48 hr, resp., before irradiation, while a 3rd group was kept as controls. All the findings indicate that the late effects of liver irradiation vary according to the condition of the liver cell at the time of irridation. Normal cells show late damage which is probably manifested only after these resting cells are stimulated to divide. Irradiation in the presence of hepatocellular damage results in more severe injury, and many more cells fail to recover. Liver cells irradiated during active division are more efficient in repairing radiation damage and show fewer chronic changes.

5553 SERUM ORNITHINE CARBAMYL TRANSFERASE LEVELS AND HEPATOCELLULAR DAMAGE IN RATS TREATED WITH CARBON TETRACHLORIDE.

(E.) Musser, A. W. (Duke U. Med. Ctr., Durham, N. C.) and G. H. Spooner. *Arch Path* 86(6):606-609, 1968.

The release pattern of ornithine carbamyl transferase from the liver cells of Wistar rats injured by i.p. injections of carbon tetrachloride (0.125 ml/100 g) was partly elucidated by comparing serum and tissue levels of this enzyme at different time intervals. The pattern suggested an early rise in tissue enzyme, probably representing a reaction to injury, followed by a rising serum level which reached its peak at the 48-hr interval, coincident with maximal hepatocellular necrosis. The lowest tissue level occurred 24 hr after poisoning. The data suggest that determinations of serum ornithine carbamyl transferase levels may be a sensitive test of early liver damage.

5554 AUTORADIOGRAPHIC STUDIES ON THE DISTRIBUTION OF ^{35}S-THIOACETAMIDE.

(Ger.) Schlicht, I. (Med. Clin., Free U. Berlin, Germany). *Aktuel Gastroent* pp. 298-300. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5555 TOXIC HEPATITIS DUE TO POISONOUS MUSHROOMS AND PHOSPHORUS. *(Fr.)*

Sicot, C. (Beaujon Hosp., Clichy, Paris, France). *Rev Med* 9(19):1243-1246, 1968.

5556 THE EFFECT OF ALCOHOL ON THE HEPATIC CIRCULATION: THE VASCULAR LIVER. *(Fr.)*

Bernard, A., P. Lamelin, A. Delattre and Leleu-Walle. *J Sci Med Lille* 86(5):351-358, 1968.

5557 THE HEPATOTOXICITY OF ANTIMITOTIC AGENTS: THEIR EFFECT ON LIVER FUNCTION TESTS. *(Fr.)*

Robert, J. (Brussels, Belgium), P. Barbier, J. Manaster and E. Jacobs. *Rev Int Hepat* 18(3): 427-444, 1968.

5558 DISTURBANCES IN THE METABOLIC REGULATORY CAPACITY OF THE LIVER IN RATS POISONED WITH CCl_4. *(Fr.)*

Vaisler, L. (Bucharest, Romania) and E. Costiner. *Rev Int Hepat* 18(3):463-473, 1968.

5559 ALCOHOL, SLUDGE, AND HYPOXIC AREAS OF NERVOUS SYSTEM, LIVER AND HEART.

(E.) Moskow, H. A. (Med. Coll. South Carolina, Charleston), R. C. Pennington and M. H. Knisely. *Microv Res* 1(2):174-185, 1968.

5560 AN ENZYMOLOGICAL STUDY OF THE PROBLEM OF POSTOPERATIVE LIVER DAMAGE. *(Ger.)*

Herfarth, C. (Surg. Clin., U. Marburg a. d. Lahn, Germany). *Bruns Beitr Klin Chir* 216(6):504-516, 1968.

5561 HEPATIC GLUCOSE-6-PHOSPHATE DEHYDROGENASE ACTIVITY IN IRRADIATED RATS. *(It.)*

Covi, A. (Lab. Radiopath., S. Piero a Grado Nucl. Ctr., Pisa, Italy) and B. Superina. *Boll Soc Ital Biol Sper* 44(8):783-784, 1968.

5562 ALTERATIONS OF LIVER FUNCTION CAUSED BY TOURNIQUETS, LIGATION OF THE MESENTERIC CIRCULATION AND IMMOBILIZATION IN

EXPERIMENTAL ANIMALS. *(Ger.)* Schattenfroh, C. (Surg. Clin., U. Göttingen, Germany), U. Stracke and W. Eger. *Bruns Beitr Klin Chir* 216(6):560-568, 1968.

5563 VARIATIONS IN THE ACTIVITY OF HEPATIC β-GLUCURONIDASE IN IRRADIATED RATS. *(It.)* Covi, A. (Lab. Radiopath., S. Piero a Grado Nucl. Ctr., Pisa, Italy), C. Mandalis and B. Superina. *Boll Soc Ital Biol Sper* 44(8):779-782, 1968.

5564 HEPATIC TRAUMA. *(E.)* Donovan, A. J. (U. Southern California Med. Ctr., Los Angeles), F. L. Turrill and F. L. Facey. *Surg Clin N Amer* 48(6): 1313-1335, 1968.

5565 TREATMENT OF HEPATIC INJURIES. *(E.)* Perry, J. F. Jr. (U. Minnesota Med. Sch., St. Paul), H. D. Root, C. W. Hauser and P. J. Keizer. *Surgery* 62(5): 853-861, 1967.

5566 EXTRAHEPATIC BILIARY DECOMPRESSION IN TRAUMATIZED CANINE LIVERS. *(E.)* Lane, T. C. (Mobile Gen. Hosp., Ala.) H. C. Johnson and H. S. J. Walker Jr. *Surgery* 62(6):1039-1043, 1967.

5567 INFLUENCE OF HUMORAL AND SPLENIC FACTORS IN HEPATIC REGENERATION: AN *IN VITRO* STUDY. *(E.)* Gupta, P. S. (Inst. Postgrad. Med. Educ., Calcutta, India), M. S. Chakraborty and B. K. Aikat. *Indian J Med Res* 56(8):1164-1173, 1968.

5568 EFFECT OF WHOLE BODY IRRADIATION WITH AN EXPOSURE DOSE OF 1,400 R ON PYRIDINE NUCLEOTIDE VALUES IN NORMAL AND REGENERATING RAT LIVER. *(E.)* Beneš, J., (Milit. Vet. Res. Inst., Prague, Czechoslovakia) and B. Zícha. *Physiol Bohemoslov* 17(3):259-270, 1968.

See also abstract nos.: 4796,4798,4801

5569 **EPIDEMIC HEPATITIS IN RELATION TO THE BLOOD GROUPS.** *(Turk.)* Cobankara, S. (Med. Fac., Ankara U., Turkey). *Tip Fac Mec* 21(1):79-86, 1968.

Among 175 patients with viral hepatitis as diagnosed on the basis of clinical history and laboratory tests, 56% had blood type A, 22% had type O, and the remainder were type B or AB; 12 of the patients were Rh-negative. For purposes of comparison, blood typing was also done in 12,245 persons taken from the general population; of these, 43% were type A and 33% were type O. There was no significant difference between hepatitis patients and controls in the incidence of types B and AB, but type A was found significantly more commonly in the hepatitis patients. No explanation is offered for the higher incidence of viral hepatitis in persons with type A blood, but further immunological, serological and genetic studies are urged.

5570 **ABDOMINAL SEQUELS AFTER VIRAL HEPATITIS IN ISRAEL.** *(E.)* Steinitz, H. (Zamenhof Workers' Clin., Tel Aviv, Israel). *Digestion* 1(3): 140-148, 1968.

Follow-up studies in 1400 patients (924 men and 476 women) who had been treated for acute icteric viral hepatitis 3-40 yr before revealed "late posthepatitic abdominal disorders" in 61 men and 72 women (9.5%). Most of the 10 patients with a functional posthepatitic syndrome (weakness, neuroautonomic instability, fat intolerance, painful pressure in the right epigastrium, lack of appetite, and/or physical and mental fragility) had suffered for many years, possibly due to partial damage of the liver, pancreas, or small intestine. The 109 chronic hepatitis patients, representing the majority of those with posthepatitic disorders, presented with varying degrees of liver damage, from liver sensitivity and enlargement to scarring and fatal cirrhosis. Extrahepatic biliary tract disorders were seen during or immediately after viral hepatitis in 15 patients (5 of whom also had chronic hepatitis), and 32 of these patients had liver or biliary tract disease in close relatives, compared to only 8 of the 1267 others. There were 4 cases of gastroduodenitis and 45 of duodenal ulcer (only 11 of which were temporally related to the hepatitis), but no posthepatitic chronic pancreatitis or hemolytic anemia was observed. Amebiasis was found in 338 of the 1400 persons with viral hepatitis (24%) and in 62 of the 133 persons with posthepatitic disorders (47%), although in 305 of the 338 cases the hepatitis preceded the amebiasis.

5571 **NATURAL HISTORY OF ACTIVE CHRONIC HEPATITIS. I. CLINICAL FEATURES, COURSE, DIAGNOSTIC CRITERIA, MORBIDITY, MORTALITY AND SURVIVAL.** *(E.)* Mistilis, S. P. (Royal Prince Alfred Hosp. Sydney, Australia), A. P. Skyring and C. R. B. Blackburn. *Aust Ann Med* 17(3):214-223, 1968.

The onset, clinical course, liver function, morbidity, mortality, endocrine changes and survival were analyzed in 82 patients with active chronic hepatitis, diagnosed on the basis of strict criteria. Of the 82 patients, 65 were females with a peak incidence age of 11 to 30 yr. One-third of the patients had an abrupt onset indistinguishable from acute infectious hepatitis, while two-thirds had an insidious onset with variable symptomatology. Signs of hypercorticism were uncommon in the absence of steroid therapy. Anicteric disease was found in 20% of the patients. Serum bilirubin was usually less than 10 mg/100 ml, SGOT levels rarely exceeded 500 U/ml, and hyperglobulinemia greater than 7 g/100 ml was found in only 9 cases. Antinuclear factors were commonly detected in patients without the presence of L.E. cells. Hypersplenism was common even in the absence of cirrhosis. Recurrent episodes of active liver disease were commonly seen. Although the disease became inactive in 41% of patients, all eventually developed cirrhosis and some developed portal hypertension. Of the 21 deaths, 50% occurred in the first few years when the disease was most active. Prognosis was significantly better for patients having insidious onset of the disease without jaundice or in patients in whom the disease became inactive early. Age, sex, endocrine changes, organ involvement other than the colon, episodic jaundice, hypersplenism, or the presence of L.E. cells had no effect on mortality. Death was usually due to liver cell failure with jaundice, ascites and hepatic coma.

5572 **OUTBREAK OF VIRAL HEPATITIS IN A MUNICIPAL HOSPITAL.** *(E.)* Robinson, C. G. (Coney Island Hosp., Brooklyn, N. Y.), J. L. Gladstone, S. Goodman and B. D. Schulman. *Arch Intern Med* 122(10): 318-321, 1968.

During a 9-week period in the fall of 1966, 4 private-duty nurses at a municipal hospital developed viral hepatitis. The only patient cared for by all 4 nurses was a 35-yr-old man receiving peritoneal dialysis and repeated blood transfusions for chronic glomerulonephritis. The incubation period between contact with this patient and the development of hepatitis was 62-77 days, but only one of the 4 nurses had a definite recollection of accidental needle puncture or wound inoculation. The first 2 cases (40-43 yr old) terminated in fatal hepatic coma and autopsies revealed shrunken, collapsed livers with widespread areas of hepatocellular necrosis. The other 2 nurses (22-27 yr old) recovered. After the death of the first 2 nurses, 4 cc of gamma-globulin was given to 1900 of the 2200 hospital employees, and SGPT determinations were carried out in 1300 employees who may have come into contact with the patient or the nurses. An SGPT above 40 units was obtained in only 23 cases, and after repeat testing supplemented by determinations of the SGOT, thymol turbidity, serum bilirubin and cephalin flocculation, only 7 of these showed persistent abnormalities. Of these 7, one had infections mononucleosis, 2 were alcoholics, and 4 had minor chemical abnormalities of uncertain origin. Not one case of subclinical hepatitis was definitely diagnosed by this survey, and SGPT screening is considered to be useless for this purpose. During a discussion of the mode of transmission of serum hepatitis in a hospital environment, the possibility of oral spread of this disease is emphasized.

5573 **FUNCTIONAL INTERACTIONS BETWEEN THE LIVER AND THE ADRENAL CORTEX IN ACUTE HEPATITIS.** *(Pol.)* Borzuchowska, A. (Infect. Dis.

Clin., Acad. Med., Bialystok, Poland). *Roczn Akad Med Marchlewski* 12:53-74, 1967.

Biochemical studies on 110 patients (35 men and 75 women) with acute viral hepatitis, 13 (4 men and 9 women) with obstructive jaundice, and 21 healthy controls (8 men and 13 women) revealed a significant decrease in urinary 17-ketosteroid and 17-hydroxycorticosteroid excretion. Adrenocortical function was found to be inversely proportional to the degree of liver damage as indicated by serum transaminase and bilirubin levels (over 12 mg% in 28 of the 110 hepatitis patients and 5-12 mg% in another 39). Based on the results of ACTH stimulation (25 mg) and the Thorn test, as well as the lack of normalization of urinary ketosteroid excretion during convalescence from acute viral hepatitis, it is concluded that persistent adrenocortical insufficiency may be one of the sequellae of viral hepatitis. Experimental studies on liver homogenates prepared from male Wistar rats subjected to adrenalectomy (or sham operation) and maintained under various conditions demonstrated that only biologically active glucocorticoids exert any protective effect on the liver cell.

5574 THE FINE STRUCTURE OF NUCLEI AS REVEALED BY ELECTRON MICROSCOPY. V. INTRANUCLEAR INCLUSION BODIES IN HEPATIC PARENCHYMAL CELLS IN CASES OF SERUM HEPATITIS. *(E.)*

Yasuzumi, G. (Nara Med. U., Kashihara City, Japan), I. Tsubo, K. Okada, A. Terawaki and Y. Enomoto. *J Ultrastruct Res* 23(3/4):321-332, 1968.

A study of the fine structure and Mg-ATPase activities of liver cells from patients with serum or infectious hepatitis had previously revealed several unusual inclusion bodies of different shapes and sizes in the parenchymal cell nuclei. An electron-microscopic study of these inclusion bodies, with particular attention to ATPase activity as determined by the Wachstein-Meisel method, revealed vesicles containing dense virus-like particles approximately 200 Å in diameter. The inclusion bodies were usually round or oval, varying in size from 1.0 to 2.3 microns, and were bounded by a distinct, double-layered, discontinuous membrane. Since they contained several cytoplasmic organelles or their derivatives, in addition to elements of the agranular or granular endoplasmic reticulum, the inclusion bodies are believed to have been formed by invagination of the nuclear envelope. As the inclusion bodies increased in size, they became more complicated in structure, with the appearance of lipid-like dense bodies and a decrease in the ATPase activity in the pore complex of the invaginated nuclear envelope. It is suggested that these intranuclear inclusion bodies may be an expression of the nuclear modifications associated with viral infection, resulting from an increase in the ratio between the surface of the nucleus and its volume and a higher level of metabolic activity.

5575 MORPHOLOGICAL VARIANTS OF NECROBIOTIC PROCESSES IN LIVER CELLS IN EXPERIMENTAL VIRUS HEPATITIS OF MICE AS REVEALED BY ELECTRON MICROSCOPY. *(E.)*

Besprozwannij, B. K. (Inst. Virol., Moscow, USSR), O. B. Shumkina, H. P. Belikov and V. I. Tsipkin. *Acta Med Pol* 9(2):183-195, 1968.

Liver tissue obtained from CC-57 brown mice 1-5 days after i.p. inoculation with centrifuged liver suspension prepared from mice with MHV-3 viral hepatitis (0.1 ml of 10^{-3}-10^{-5} dilution) was examined by light and electron microscopy. This revealed 3 main types of necrobiotic processes, all of which were similar to the pathological findings in human viral hepatitis: the appearance of basophilic bodies in the cytoplasm, acidophilic coagulation of the cytoplasm, or primary destruction of the nucleus. The first type, which was most commonly encountered, was characterized by disintegration of the rough endoplasmic reticulum, disappearance of the membranes, and dissociation of the ribosomes followed by their condensation into large conglomerates; the Golgi complex retained its structure, and the peripheral area of the cytoplasm often showed considerable clarification. Acidophilic coagulation, either generalized or focal, was characterized by dissociation of the liver cells, homogenization of the cytoplasm, nuclear pyknosis, and the formation of Councilman and Mallory bodies. Both focal coagulation and the necrobiotic process characterized by primary destruction of the nucleus were more commonly seen in the peripheral zones of the necrotic focus. These changes are all considered to be variants of a general nonspecific response to hepatocellular damage of whatever etiology, resulting in the development of large necrotic foci in the liver parenchyma with large numbers of hematoxylin-positive bodies derived from disintegrating cellular structures. No virus particles were seen in any of the specimens.

5576 THE BEHAVIOR OF ASPARTIC AND ALANINE AMINOTRANSFERASES, LACTIC DEHYDROGENASE, CHOLINESTERASE, PROTHROMBIN, β-GLUCURONIDASE, BILIRUBIN, THYMOL TURBIDITY TEST AND SERUM PROTEINOGRAMS UNDER THE INFLUENCE OF CORTICOTHERAPY IN THE COURSE OF VIRAL HEPATITIS IN CHILDREN. *(E.)*

Drozdz, H. (2nd Clin. Int. Dis., Med. Acad., Krakow, Poland), A. Jedrychowski, T. Szreniawska, Z. Wojcik, A. Baniowski and B. Biernacka. *Acta Med Pol* 9(2):231-241, 1968.

In a group of 39 children (6-14 yr old) with viral hepatitis, 20 received steroid therapy (Encorton in doses decreasing from 1 mg/kg) for periods of 10-12 days and 19 were kept as controls. Comparison of the changes in liver function tests and plasma proteins in the two groups revealed no significant differences in the levels of aspartic and alanine aminotransferase, cholinesterase, prothrombin or thymol turbidity. However, the steroid group showed a marked prolonged rise in β-glucuronidase, a greater increase in alpha-2 globulins, smaller increases in serum total protein and albumin, and a greater drop in the β- and γ-globulins. Corticotherapy had no effect on the duration of the disease, but increased lactic dehydrogenase levels and jaundice disappeared more quickly in the treated group. These results provide no evidence that corticosteroids have a favorable effect on hepatocellular function.

5577 MEASLES, RUBELLA, VARICELLA, PERTUSSIS, EPIDEMIC PAROTITIS, VIRAL HEPATITIS AND POLIOMYELITIS AMONG 2400 FAMILIES REGISTERED WITH THE SOCIAL SECURITY SERVICE DURING THE YEARS 1963, 1965 AND 1966. *(Sp.)*

Royo Montanés, M. (Zaragoza, Spain). *Rev Esp Pediat* 24(141):359-377, 1968.

5578 VIRAL HEPATITIS AND PULMONARY TUBERCULOSIS. *(Ger.)*

Hauck, F. (Wichern Hosp., Ludwigshafen-Oggersheim, Germany). *Acta Hepatosplen* 15(1):30-36, 1968.

5579 THE CLINICAL LABORATORY DIAGNOSIS AND TREATMENT OF INFECTIOUS HEPATITIS. *(Ser.)* Kallai, L. (Med. Fac., U Zagreb, Yugoslavia), D. Kocić and T. Miklousić. *Lijecn Vjesn* 90(4):325-335, 1968.

5580 CHRONIC HEPATITIS. *(Ser.)* Reiner, I. (Dr. M. Stojanović Gen. Hosp., Zagreb, Yugoslavia). *An Boln Dr. M. Stojanovic* 7(1):14-18, 1968.

5581 AN ELECTRON MICROSCOPIC STUDY OF THE FORMATION OF PLASMA CELLS IN THE LIVER DURING THE ACUTE PHASE OF VIRAL HEPATITIS. *(Rus.)* Shumkina, Q. B. (D. I. Ivanovskii Inst. Virol., Acad. Med. Sci. USSR, Moscow), B. K. Bezprozvannyi, T. I. Gorbunova and I. V. Shakhgil'dian. *Arkh Pat* 30(7): 42-49, 1968.

5582 A MATHEMATICAL STUDY OF ASSOCIATED CARYO-INTERCARYOGRAMS IN HEPATITIS EPIDEMICA. *(E.)* Tasca, C. (V. Babes Inst. Path. Anat., Bucharest, Romania), D. Enachescu and E. C. Craciun. *Beitr Path Anat* 137(3):316-329, 1968.

5583 BEHAVIOR OF THE IMMUNOGLOBULINS DURING ACUTE FULMINATING HEPATITIS. *(It.)* Matano, F. (Infect. Dis. Clin., U. Naples, Italy), G. Di Stasio, C. Pezzullo, T. Ferraro and G. Manzillo. *Riv Ist Sieroterap Ital* 43(2):82-91, 1968.

5584 THE SEQUELLAE OF INFECTIOUS HEPATITIS. *(Ger.)* Theuer, D. (Charité Hosp., Berlin, Germany). *Deutsch Gesundh* 23(34):1593-1599, 1968.

5585 "PERSISTENT HEPATITIS" IN COMPARISON WITH OTHER CHRONIC SEQUELLAE OF EPIDEMIC VIRAL HEPATITIS. *(Rev.)(Ger.)* Haug, H. (Med. Polyclin., U. Wurzburg, Germany). *Klin Wschr* 46(5):221-233, 1968. [308 refs.]

5586 HISTOPATHOLOGY OF THE LIVER IN THE FATAL FULMINATING FORM OF INFECTIOUS HEPATITIS. *(Por.)* Campos, E. P. (Inst. Adolfo Lutz, Sao Paulo, Brazil). *Rev Inst Adolfo Lutz* 25/27:47-60, 1965/67.

5587 CLINICAL, HISTOLOGICAL AND PATHOGENETIC ASPECTS OF CHRONIC VIRAL HEPATITIS. *(Fr.)* Dediu, S. (Bucharest, Romania). *Rev Int Hepat* 18(3):487-514, 1968.

5588 THE EPIDEMIOLOGY AND CLINICAL CHARACTERISTICS OF ACUTE HEPATITIS. *(Ger.)* Müting, D. (1st Med. Clin., U. Saar, Homburg, Germany) and G. Mehler. *Deutsch Med Wschr* 93(42):1985-1989, 1968.

5589 PANMYELOPATHY FOLLOWING ACUTE HEPATITIS. *(Ger.)* Vaništa, J. (Fac. Pediat. Med., Prague, Czechoslovakia) and L. Srámková. *Med Klin* 63(19):757-759, 1968.

5590 INCREASED SUSCEPTIBILITY TO MURINE HEPATITIS VIRUS INFECTION BY TREATMENT WITH IRON SALTS. *(E.)* Warren, J. (Dept. Biol. Res., Chas. Pfizer & Co., Terre Haute, Indiana), R. J. Mason, L. H. Barbosa, K. L. Gabbard and M. Bucy. *Proc Soc Exp Biol Med* 129(2):637-642, 1968.

5591 VIRAL AGENTS IN HEPATITIS: A REVIEW. *(E.)* Hersey, D. F. (Smithsonian Inst., Washington, D. C.) and E. D. Shaw. *Lab Invest* 19(5):558-572, 1968.

See also abstract nos.: 5534,5543

5592 **METABOLIC BUFFERS IN HEPATIC FAILURE.** *(E.)* Grossi, C. E. (St. Vincent's Hosp. Med. Ctr., New York City), B. Prytz and L. M. Rousselot. *Surgery* 64(5):928-933, 1968.

In order to justify a clinical trial of mixtures of aspartic acid and ornithine to counteract ammonia toxicity in patients with hepatic encephalopathy, the multiple pathways of amino acid and glucose metabolism were evaluated in Eck-fistula dogs, 2 months after creation of the end-to-side portacaval shunt, and in 20 patients with chronic liver disease; 14 of the patients had previously had a portacaval shunt. Four Eck-fistula dogs on a high-protein diet (1 lb horse meat daily) were found to have increased blood ammonia (123-205 μg%), glucose and lactic acid levels, along with low values for acid-soluble phosphate (8.3-13.2 mg%). After 4 days on a mixture of aspartic acid and ornithine (1 μM/day/kg of each amino acid), the ammonia, lactic acid and glucose levels had decreased while the acid-soluble phosphate had increased. Serial studies on one dog showed a rapid decrease in blood ammonia during the 1st 2 days on amino acid therapy, followed by a return to high values when the amino acids were withdrawn. Similarly, the cirrhotic patients showed elevated glucose, amino-acid nitrogen, lactic acid, ornithine, adenosine deaminase and ornithine transcarbamylase levels, with low values for alpha-keto-acids and acid-soluble phosphate. It is pointed out that glucose catabolism requires ATP, making it unavailable for ammonia detoxication and thus resulting in increased blood ammonia levels following a glucose load in patients with hepatic disease. A mixture of ornithine and aspartic acid apparently has a sparing effect on ATP, permitting the detoxication of ammonia in the presence of less ATP, which can thus be used for carbohydrate metabolism.

5593 **STIMULATION OF INSULIN SECRETION IN MAN BY MEDIUM CHAIN TRIGLYCERIDES.** *(E.)* Greenberger, N. J. (Ohio State U. Coll. Med., Columbus), M. Tzagournis and T. M. Graves. *Metabolism* 17(9):796-801, 1968.

In 9 patients (5 men and 4 women, 26-69 yr old) with cirrhosis of the liver (Laennec's in 4, postnecrotic in 5), esophageal varices, splenomegaly (8 cases), ascites (6 cases) and evidence of portal-systemic communications (portacaval shunt in 2 cases), but no evidence of diabetes mellitus, oral administration of 30 ml of Medium Chain Triglyceride (containing 80% trioctanoin and 17% tridecanoin) produced a significant increase in serum insulin levels (from a mean fasting value of 15.7 ± 1.8 μU/ml to a peak of 28.7 ± 5.0 μU/ml at 1 hr, with values above 30 μU/ml being reached in 5 cases) without any change in blood glucose or plasma free fatty acids. There were no significant changes in any of these parameters in 10 normal controls (males, 22-35 yr old). Plasma free fatty acid levels increased slightly in the cirrhotics, and 3 patients in whom the necessary studies were done all showed increases in blood octanoate (to 288, 398 and 539 μEq/liter, resp.). The greater effect on serum insulin in cirrhotic patients is tentatively ascribed either to shunting around the liver or to a decrease in liver cell mass capable of binding insulin. The lack of an effect on blood glucose may have been due to endogenous insulin resistance secondary to chronic hepatic disease.

5594 **THE MUTUAL INTERACTION BETWEEN HEPATIC AND ADRENOCORTICAL FUNCTION: THE DIURNAL RHYTHM OF BIOLOGICALLY-ACTIVE FREE GLUCOCORTICOIDS AND SOME METABOLITES IN NORMAL SUBJECTS AND IN PATIENTS WITH CIRRHOSIS OF THE LIVER.** *(Ger.)* Gerdes, H. (Med. Clin., U. Marburg a. d. Lahn, Germany), B. Winkler and G. Strohmeyer. *Klin Wschr* 46(21):1149-1155, 1968.

The urinary excretion of free 17-hydroxycorticosteroids, cortisol, cortisone, their tetrahydro- derivatives, and their 20-hydroxy- and 6-hydroxy- derivatives was determined in 10 normal controls and in 9 patients (8 men and 1 woman, 28-68 yr old) with histologically-confirmed alcoholic or post-hepatitic cirrhosis of the liver as shown by the results of liver function tests. The average urinary excretion of C_{21}-steroids was 368.0 μg/day in the controls and 436.5 μg/day in patients with cirrhosis, a value which corresponded to 79.3% and 72.8%, resp., of the urinary excretion of free 17-hydroxycorticosteroids in these two groups (464.0 and 599.1 μg/day, resp.). Not only was the total excretion higher in patients with cirrhosis, but the diurnal variations normally found were absent and there were quantitative shifts in the excretion pattern which indicated alterations in cortisol metabolism. Thus, the urinary cortisone/cortisol ratio was 5.89 in cirrhotics and 0.72 in controls, and in the cirrhotic urines the ratio of C_6 and C_{20} hydroxylated metabolites to cortisol and cortisone was higher than the ratio between the tetrahydro-derivatives and the free hormones. These findings support the concept that progressive impairment in hepatic degradation of cortisol may lead to reduced diurnal variation in free cortisol and its metabolites, resulting in pituitary suppression and, in turn, reduced adrenocortical production of cortisol.

5595 **STUDIES IN NEONATAL HEPATITIS AND BILIARY ATRESIA. III. PROGRESSION AND REGRESSION OF CIRRHOSIS IN BILIARY ATRESIA.** *(E.)* Thaler, M. M. (Harvard Med. Sch., Boston, Mass.) and S. S. Gellis. *Amer J Dis Child* 116(3):271-279, 1968.

The effects of persistent biliary obstruction on the development of hepatic fibrosis and liver function, and the possibility of restoration of liver structure and function following successful surgical repair of atretic ducts, were investigated in 125 specimens of liver tissue obtained by biopsy and autopsy from 135 infants with partial or complete biliary atresia seen during a 10-yr period. Surgical repair was attempted in 13 of these cases, and was successful in 3. Hepatic scarring was not a function of age. Slow progression of cirrhosis over a period of several months, as revealed by serial biopsies, did not correspond to the patient's clinical status. Three infants found to have moderate to severe cirrhotic changes at operation were restored to normal health by successful bile duct to bowel anastomosis. These findings reveal that factors other than age play a role in the development of cirrhosis in biliary atresia. Advanced cirrhotic changes may completely regress once biliary flow is re-established.

5596 **CIRRHOSIS ASSOCIATED WITH METHOTREXATE TREATMENT OF PSORIASIS.** *(E.)* Coe, R. O. (U. Michigan Med. Ctr., Ann Arbor) and F. E. Bull. *JAMA* 206(7):1515-1520, 1968.

Postnecrotic cirrhosis of the liver developed in 3 nonalcoholic patients with psoriasis who had been maintained on oral methotrexate (12.5-25 mg/week) for 11-40 months. Portal hypertension with esophageal varices developed in 2 patients. The signs of cirrhosis developed insidiously and were not accompanied by signs of acute gastrointestinal or hematologic toxic conditions. There is a need for caution in the use of methotrexate in benign disease. A prospective study should be carried out to determine the best method of monitoring the hepatotoxicity of this drug during long-term administration.

5597 ALTERED ACTIVITY OF THE ENZYMES OF ENERGY METABOLISM IN THE THROMBOCYTES OF PATIENTS WITH CIRRHOSIS OF THE LIVER AND SPLENOMEGALY. *(Ger.)* Goebell, H. (Med. Clin., Philipps U., Marburg a.d. Lahn, Germany), H. Bickel, C. Bode, R. Egbring and G. A. Martini. *Klin Wschr* 46(10):526-533, 1968.

The activities of 28 enzymes involved in glycolysis, the pentose-phosphate shunt, the Krebs cycle, the glycerophosphate cycle and transamination reactions were compared in the platelets isolated from 17 normal subjects (10 men and 7 women, average age 28 yr, with platelet counts of 154,000-420,000/mm^3) and 15 patients with proven cirrhosis of the liver of 1-5 yr duration. Among the 15 cirrhotics (9 men and 5 women, average age 54 yr), 8 had splenomegaly, 5 had esophageal varices, 4 had ascites, 6 were jaundiced, and 11 had platelet counts below 150,000/mm^3. In the platelets of patients with splenomegaly due to portal hypertension, the enzyme activities in all pathways were markedly elevated, although phosphofructokinase was generally normal and lactic dehydrogenase was depressed. With one exception, the patients without splenomegaly showed normal or slightly depressed platelet enzyme activities, the one exception being a 50-yr-old man with a platelet count of 100,000/mm^3 and well-compensated liver function who showed a 6-8 fold increase in nearly all the enzymes measured (except lactic dehydrogenase, which was below normal). There was no correlation between platelet enzyme activities and liver function tests or platelet count. As in other tissues, there was a constant proportion of the various enzymes in the mid-portion of the glycolytic pathway, along with a high activity of mitochondrially localized isocitric dehydrogenase and glycerophosphate oxidase. The platelets in cirrhotic patients thus seem to be enzymatically normal, in contrast to those in thrombasthenia, the higher enzyme activity in patients with splenomegaly being ascribed to a higher proportion of younger platelets due to compensatory hyperactivity of the bone marrow.

5598 THE NORMALIZING EFFECT OF A *BACTERIUM BIFIDUM* MILK ON PROTEIN METABOLISM IN CIRRHOSIS OF THE LIVER. *(Ger.)* Müting, D. (1st Med. Clin., U. Homburg/Saar, Germany), H. Reikowski, W. Eschrich, C. Klein and D. Doenecke. *Deutsch Med Wschr* 93(27):1313-1319, 1968.

In the search for a cheaper and more physiological way than administration of neomycin to suppress the pathological intestinal flora responsible for the increased blood levels of ammonia and other protein catabolites (free amino acids, phenols, indican) in patients with hepatic cirrhosis, a study was made of the effect of *Bacterium bifidum (Lactobacillus bifidus)* milk on the blood and urine levels of these compounds in 33 cirrhotic patients, as well as the effect of prolonged treatment (4-720 days, average 100 days) with this preparation (Eugalan forte Töpfers) on appetite, bowel function, body weight and liver function tests. The patients included 3 adolescents and 30 adults (12-70 yr old), 13 of whom already had severe portal hypertension and 4 of whom were in a precomatose state. The preparation contained 10% protein, 84% carbohydrate and 3% salts, and was given at an initial dosage of 10 g 3-5 times daily gradually increased to 100 g t.i.d. after meals; some of the patients also received enzyme therapy, but none received antibiotics. Treatment had to be interrupted due to intolerance in 2 cases, and another 7 patients had mild side effects. Establishment of *B. bifidum* in the intestines of both young and adult patients resulted in intestinal acidification, slightly improved protein synthesis (prothrombin increased from 51.8-74.2% to 65.4-85.0%), and a significant decrease in blood ammonia (from 143-193 to 73-129 μg%), alpha-amino nitrogen (from 4.54-4.58 to 3.87-3.97 mg%), free phenols (from 1.43-1.65 to 0.89-0.93 mg%), SGPT (from 14.3-21.9 to 11.4-15.3), and the urinary excretion of amino acids and phenols. The preparation is especially recommended in relatively compensated patients without severe portal hypertension.

5599 SERUM ANGIOTENSINASE ACTIVITY IN CIRRHOSIS. *(E.)* Lubash, G. D. (U. Maryland Sch. Med., Baltimore), E. C. Hammel and R. J. Mearles. *Amer J Med Sci* 255(2):105-113, 1968.

The serum angiotensinase activity was determined by 2 methods in 13 patients with liver dysfunction. The assays of enzyme activity using angiotensin II amide as the substrate showed increased activity, but the slight increase found with α-L-aspartyl-β-naphthylamide as the substrate was not statistically significant. Since the naphthylamide substrate is believed to reflect the degradation of naturally occurring angiotensin more closely than does the angiotensin II amide substrate, statistical proof of increased angiotensinase activity in liver dysfunction is lacking. The poor correlation of the 2 methods for assaying angiotensinase activity provided confirmation of quantitative variations in some angiotensin-destroying enzymes among the several contributing to total activity in liver disease. Since angiotensinase activity did not correlate significantly with either plasma renin activity or total serum bilirubin, it seems unlikely that increased angiotensinase activity controls, or is controlled by, changes in these parameters. The significance of altered angiotensinase activity is not clear.

5600 DIETARY FAT IN EXPERIMENTAL CIRRHOSIS IN THE RAT. *(E.)* Patek, A. J. Jr. (Goldwater Mem. Hosp., New York City), F. E. Kendall, N. M. O'Brian and R. L. Hirsch. *Arch Path* 86(5):545-550, 1968.

The modifying effects of dietary fat on the development of experimentally-induced choline-deficiency cirrhosis were studied in male Wistar rats. Two basic diets were employed: diet A contained 72% sucrose and 6% casein plus 6% soya protein, and was thus deficient in choline but adequate in protein; diet B contained 81% starch and 4% casein, and was thus deficient in both choline and protein. Both diets contained 10% of either corn oil, hydrogenated corn oil, butter fat or safflower seed oil. Triglyceride, cholesterol and phospholipid determinations and microscopic examinations of liver tissue were performed after 4 months on each diet. Animals fed diet A had normal growth curves while those fed diet B had subnormal growth curves. Hepatic triglyceride and cholesterol levels were increased in all groups irrespective of diet, with no significant correlation between the degree of cirrhosis and the increased levels. Phospholipid concentrations were similarly decreased in all groups. Animals fed hydrogenated corn oil with either diet A or B developed little or no hepatic cirrhosis. Animals fed regular corn oil developed considerable hepatic fibrosis and cirrhosis, more marked in animals fed diet B than diet A. Animals fed butter fat or safflower seed oil with diet B also developed considerable fibrosis and cirrhosis. It appears that certain polyunsaturated fats (corn oil and safflower seed oil) and certain saturated fats (butter fat) favor the development of cirrhosis under appropriate conditions, whereas certain other fats (coconut oil and hydrogenated corn oil) do not favor the production of cirrhosis and may even inhibit it. Neither the degree of saturation nor the chain length of the component fatty acids are the sole factors in the development of cirrhosis.

5601 METABOLISM OF ALBUMIN IN CIRRHOSIS STUDIED BY A DOUBLE-ISOTOPE TECHNIQUE. *(E.)* Ewe, K. (Mayo Clin., Rochester, Minn.), W. H. J. Summerskill, J. P. Marcoux and W. N. Tauxe. *Digestion* 1(4): 200-208, 1968.

Albumin metabolism was studied in 12 patients with hepatic cirrhosis, hypoalbuminemia and portal hypertension. Albumin turnover was studied with ^{125}I-labeled human serum albumin (50 μC), and intestinal albumin loss with the simultaneous administration of ^{131}I-labeled polyvinylpyrrolidone (50 μC i.v.). ^{131}I-polyvinylpyrrolidone activity in the stool was not increased in any case. Albumin degradation was generally low and correlated with the depletion of total exchangeable albumin. Assuming a steady state, the findings of a decreased extravascular albumin pool in the absence of a demonstrable increase in metabolic degradation or intestinal loss requires an impairment in the rate of albumin synthesis to explain the findings. Plasma volume was increased in most cases. Hypoalbuminemia in the presence of a normal intravascular albumin pool is therefore caused by hemodilution.

5602 PREGNANCY IN PATIENTS WITH HEPATIC CIRRHOSIS: MANAGEMENT AND OUTCOME. *(E.)* Whelton, M. J. (Royal Free Hosp., London, England) and S. Sherlock. *Lancet* 2(7576):995-999, 1968.

The clinical course and outcome of 16 pregnancies in 13 women with cirrhosis of the liver were studied. Among 8 patients with active chronic hepatitis, 5 deteriorated during pregnancy; within 2 months postpartum, 4 had returned to their pre-pregnancy state, while 1 died 8 days after delivery in hepatic failure. There were 5 normal infants, 1 neonatal death of a malformed child, 1 early therapeutic abortion, 2 spontaneous abortions, and 1 stillborn fetus. Subsequently, 3 mothers have died, surviving a mean of 2.6 yr after their pregnancy. Among 5 patients with primary biliary cirrhosis, 2 early spontaneous abortions occurred in 1 patient with no alteration in her liver function. Serum bilirubin levels increased in all 4 patients who went to term and remained elevated postpartum, and 1 also developed toxemia. There were 2 normal infants and 2 stillbirths. There were no maternal deaths, but 3 mothers have subsequently died, surviving a mean of 4.3 yr after their pregnancy. The maternal prognosis for the entire group was that of the underlying liver disease and the same as for a woman with cirrhosis who has not become pregnant. There was a high fetal wastage but no apparent transmission of the liver disease from the mother to the fetus.

5603 POSTSHUNT ENCEPHALOPATHY. *(E.)* McDermott, W. V. Jr. (Massachusetts Gen. Hosp., Boston), B. A. Barnes, G. L. Nardi and F. W. Ackroyd. *Surg Gynec Obstet* 126:585-590, 1968.

Postshunt encephalopathy developed in 18% of a group of 410 patients in whom elective portal-systemic shunts were created because of 1 or more episodes of esophageal variceal hemorrhage; this complication was twice as frequent in patients with portacaval as compared with splenorenal shunts, despite the fact that, on the basis of physical status evaluation and liver function tests, the group with splenorenal shunts represented a significantly better risk group in all parameters. The incidence of encephalopathy increased steadily with age, from 8% in patients up to 19 yr of age to 35% in patients in whom shunts had been constructed after 70 yr of age. Data on liver blood flow indicated that patients with encephalopathy showed a greater tendency toward a postoperative decrease in liver blood flow. The basis for the treatment of postshunt encephalopathy is the restriction of protein to 40 g/day and intermittent or continuous use of neomycin to alter the colonic flora responsible for the production of ammonia. Treatment with *Lactobacillus acidophilus* appears to be a valuable adjunct to therapy but is still in an exploratory phase. Intractable patients often show distinct improvement in protein tolerance after the surgical exclusion of the colon by ileosigmoidostomy.

5604 DISTRIBUTION OF WATER AND ELECTROLYTES IN THE ERYTHROCYTES OF NORMAL AND CIRRHOTIC SUBJECTS. *(Fr.)* Afifi, F. (Beaujon Hosp., Clichy, Paris, France), P. Boivin and R. Fauvert. *Path Biol* 16(19/20):847-851, 1968.

Water and electrolyte (Na, K, Ca) concentrations in the plasma and erythrocytes were compared in 37 normal subjects and 42 patients with alcoholic cirrhosis and ascites. Although the sum of the Na and K in the erythrocytes (mEq/kg dry weight) was the same in cirrhotic patients as in normal controls (273.22 ±35.30), the cirrhotics showed an average increase in red cell sodium (6.97 ±4.72 mEq/kg compared to 4.57 ±2.26 in controls) and a decrease in plasma sodium (132.2 ±9.4 mEq/kg compared to 139.1 ± 8.25 in controls). The calcium concentration was decreased slightly in cirrhotics in both the red cells (2.06 mEq/kg compared to 2.19) and the plasma (4.82 mEq/kg compared to 4.99), but the differences were not statistically significant. In both normal and cirrhotic subjects, there was a direct correlation between the sum of Na and K and the water content of the erythrocytes, so that the total univalent cation concentration remained essentially constant.

5605 LACTULOSE IN THE TREATMENT OF ENCEPHALOPATHY DUE TO PORTACAVAL SHUNT. *(Fr.)* Lande, M. (Cochin Hosp., Paris, France) and C. Clot-Paimboeuf. *Presse Med* 76(34):1675-1676, 1968.

Lactulose (Duphalac; 80-160 ml/day of a 50% syrup p.o. for from 5 days to several months) was used in the treatment of 12 patients with hepatic encephalopathy varying in degree from mere somnolence to deep coma; 7 of these patients had received portacaval shunts while in the other 5 the normal detoxification of intestinal bacterial metabolites was prevented by severe cirrhosis. As a result of lactulose therapy, improvement in consciousness was obtained in 10 patients, improvement in the electroencephalogram also in 10 (but aggravation in 1), and and a decrease in blood ammonia levels in 6 of the 10 who showed clinical improvement (in 3 of the other 4 the blood ammonia levels were normal initially). The 2 failures had only mild encephalopathy before treatment, one being treated on an ambulatory basis. The only side effect was occasional diarrhea (3 cases), which necessitated interruption of treatment in 2 patients. The beneficial effects of lactulose are ascribed to a lowering of the fecal pH, favoring the development of *Lactobacillus* rather than a proteolytic flora.

5606 ALTERATION IN THE TERTIARY STRUCTURE OF THE γ-G-GLOBULINS IN CIRRHOSIS OF THE LIVER.

(Fr.) Badin, J. (Cochin Hosp., Paris, France) and S. Barbier. *Path Biol* 16(15-16/17-18):723-730, 1968.

In vitro studies are reported which indicate that sera from patients with cirrhosis of the liver, which are characterized by hypergammaglobulinemia and particularly by high levels of the γ-G-globulins which are precipitated out by Lugol's iodine at pH 5.9, differ in their physicochemical properties from normal sera to which excess normal γ-G-globulins have been added. Thus, they can readily be distinguished by immunoelectrophoresis, ultracentrifugation, or the Takata-Ara reaction. However, when the γ-G-globulins are partially denatured, before addition to the sera, by acidification to pH 3.0 in the presence of glycerol, followed by heating at 37C for 30 min and subsequent neutralization, then the physicochemical properties of the resultant sera are very similar to those of sera from cirrhosis patients. At identical globulin levels, cirrhotic and "denatured" hypergammaglobulinemic sera had identical euglobulin precipitation curves as a function of pH and identical turbidities in response to Kunkel's Zn reagent, La Huerga-Popper's acid ammonium sulfate reagent and MacLagen's thymol reagent. It is concluded that the γ-G-globulins in patients with cirrhosis have an abnormal spatial configuration. This is also indicated by the anticomplementary capacity of the sera, the presence of rheumatoid factors, and an increased rate of γ-G-globulin catabolism.

5607 THE PORTAL CIRCULATION IN CIRRHOSIS OF THE LIVER.

(Ger.) Ziegan, J. (St. Georg Hosp., Leipzig, Germany) and J. Massmann. *Virchow Arch Path Anat* 344(4):322-330, 1968.

A systematic autopsy study of 257 cases of hepatic cirrhosis (165 men and 92 women, 22-91 yr old, average 65.3 yr, with livers ranging in weight from 415 to 3030 g and spleens weighing 70-1271 g) showed that the incidence of splenomegaly (spleen weight above 250 g) increased with increasing liver size (r = 0.427) and reached 91% in patients with liver weights above 1500 g. In patients with an atrophic liver (less than 1000 g) rich in connective tissue, splenomegaly was rare (28%) and ascites was more common than esophageal varices (being found in 75% and 44%, resp.). Most of these patients died in hepatic coma (55%) and only 16% of the deaths were due to esophageal varices. In patients with either hypertrophic or normal-sized cirrhotic livers, however, fatal hemorrhage due to esophageal varices accounted for 25-33% of the deaths compared to 31-35% from hepatic coma. Esophageal varices were present in 49-61% of these patients and ascites was present in 56-68%. The results confirm the view that the main cause of portal hypertension is nodular regeneration of the liver cells. The portal hypertension, in turn, causes splenomegaly and esophageal varices, but is not required for the development of ascites.

5608 FAMILIAL JUVENILE CIRRHOSIS OF THE LIVER IN 3 SISTERS: CLINICAL OBSERVATIONS AND THE RESULTS OF BIOPSY AND AUTOPSY.

(Ger.) Mähr, G. (Inst. Path. Anat., Justus-Liebig U., Giessen, Germany) and K. Noeske. *Acta Hepatosplen* 15(4):209-218, 1968.

Detailed case reports are presented for 3 sisters (18, 22 and 24 yr old at last examination) who were admitted over a period of 9 yr (at 12, 13 and 24 yr of age) for cirrhosis of the liver (confirmed by biopsy in 1 case and by autopsy in another). The oldest girl first presented with hepatosplenomegaly in the presence of essentially normal liver function tests at the age of 24 yr, but the other 2 (one of whom died at the age of 22) were first seen at the age of 12-13. The 2nd sister remained moderately well for 10 yr after her first admission, but then developed amenorrhea and finally died in hepatic coma following portacaval shunt and splenectomy. The youngest child was also splenectomized at the age of 12 and has remained well thereafter. A thorough study of the clinical and pathological findings and both the individual and family histories revealed no etiological factors which could be held responsible for the course of these 3 sisters. The mother was normal, and there was no history of nor evidence for syphilis, alcoholism, malnutrition, metabolic defects, congenital malformations or Rh incompatibility. It is suggested that the cirrhosis in these cases may have been the end-result of anicteric hepatitis.

5609 STUDIES ON THE ELIMINATION OF ADIURETIN FROM THE CIRCULATING PLASMA IN HEALTHY SUBJECTS AND PATIENTS WITH HEPATIC DISEASE AND ASCITES.

(Ger.) Irmscher, K. (2nd Med. Clin. Polyclin., U. Düsseldorf, Germany), F. H. Franken and D. Gabe. *Acta Hepatosplen* 15(4):219-227, 1968.

The elimination of antidiuretic hormone (adiuretin, ADH) from the bloodstream following i.v. infusion of 7 U over a period of 1 hr (rates of 200 and 100 mU/min) was investigated by a biological assay (urine volume in anesthetized rats) in 7 healthy subjects (17-56 yr old), 6 patients with ascites due to decompensated cirrhosis of the liver, 1 patient with ascites due to a metastasizing hemangioendothelioma of the liver, and 2 patients with idiopathic diabetes insipidus. The values for the peak ADH concentration and total clearance were not significantly different in patients and controls. The half-life of ADH was 6.5-11.8 min (average 9.5 min) in the controls, 8.7-11.0 min in patients with diabetes insipidus, and 9.7-21.0 min (average 12.1 min) in patients with hepatic disease. In view of the experimental error in the bioassay of ± 38%, the difference between the average values for the controls and liver patients was also not statistically significant. However, while 4 of the patients with decompensated cirrhosis had values in the upper range of normal, the other 2 had prolonged half-lives of 12.5 and 21.0 min, resp.

These patients were both far-advanced cases with both ascites and edema, and it is concluded that insufficient inactivation of ADH, resulting in a longer half-life, is a characteristic only of the later stages of hepatic disease when both hepatic and extrahepatic mechanisms are impaired. Under these conditions, persistent ADH may contribute to the pathogenesis of ascites and edema. Extracellular distribution of ADH was indicated by the fact that its relative distribution volume was 17.3 liters/100 kg body weight in healthy controls and 20.0 liters/100 kg in patients with liver disease; however, the concentration in the ascites fluid was only 5.9% of the plasma concentration.

5610 GENETIC CHARACTERISTICS AND CIRRHOSIS: A CONTROLLED STUDY OF 200 PATIENTS. *(E.)* Reid, N. C. R. W. (Johns Hopkins U. Hosp., Baltimore, Md.), P. W. Brunt, W. B. Bias, W. C. Maddrey, B. A. Alonso and F. L. Iber. *Brit Med J* 2(5603):463-465, 1968.

The possible association between cirrhosis and hereditary factors such as color blindness, blood groups, phenylthiocarbamide sensitivity, color of the skin, eyes and hair, and body type was investigated by comparing 100 cirrhotic patients (22 Negro men, 36 Caucasian men, 17 Negro women and 25 Caucasian women, average age 50.2 yr) and 100 noncirrhotic controls (21 Negro men, 34 Caucasian men, 18 Negro women and 27 Caucasian women, average age 48 yr). The only significant finding among the 61 Caucasian cirrhotics was a higher incidence of brown hair and fair skin; although the incidence of blue eyes was somewhat higher in cirrhotics, the difference was not statistically significant. The only significant finding among the 39 Negro cirrhotics was a higher incidence of the Fy (a+b+) phenotype of the Duffy blood groups; although the incidence of color blindness was highest among Negro cirrhotics (5 of 22 cirrhotic men compared to only one control), the differences were not statistically significant (total of 13 cirrhotics with color blindness and 4 controls). The increased frequency of the Fy (a+b+) phenotype among Negro cirrhotics [11 cirrhotics and 2 controls compared to 8 and 20, resp., with Fy (a-b-)] is tentatively ascribed to increased Caucasian admixture among the cirrrhotic subjects. These results suggest a broad multifactorial base for susceptibility to cirrhosis and an increased frequency of these factors in Caucasians compared to Negroes.

5611 HEPATIC LYMPH DRAINAGE IN CIRRHOSIS AND CONGESTIVE HEART FAILURE: A POSTMORTEM LYMPHANGIOGRAPHIC STUDY. *(E.)*

Ludwig, J. (Mayo Clin., Rochester, Minn.), P. Linhart and A. H. Baggenstoss. *Arch Path* 86(5):551-562, 1968.

Dilated or varicose hepatoduodenal, parapancreatic, para-aortic and retrosternal lymphatic vessels and a dilated thoracic duct were demonstrated at autopsy by postmortem lymphangiography and dissection in 13 cases of cirrhosis of the liver. In most cases the para-aortic lymphatic vessels were most severely involved. Similar, but less severe, lymph congestion was found in 3 cases with hepatic metastases, one of subacute hepatitis, and 12 of congestive heart failure. Transhepatic shunts between capsular lymphatic vessels at the convexity of the liver and hilar lymphatic vessels, and lymphatico-venous shunts in the anterior mediastinum, were found in a few cases. Severe lymph stasis can apparently cause characteristic histologic changes in the lymph nodes. It is suggested that the para-aortic lymphatic vessels and lymph nodes might be a good site for operative lymphatico-venous shunting in patients with cirrhosis of the liver, ascites and the complications of portal hypertension.

5612 ALBUMIN TURNOVER IN SCHISTOSOMAL LIVER CIRRHOSIS. *(E.)* El Saadani, A. M. (Fac. Med., Cairo U., Egypt), M. El Sawy Habib, M. T. El Gengehy and M. A. Fayez. *Amer J Trop Med* 17(6):844-850, 1968.

Albumin turnover was measured by the administration of Amberlite resin IRA 400 (5 g every 4 hr p. o.) and ^{131}I-labelled human serum albumin (30-45 μC i.v.) in 8 normal subjects and 16 adult patients with schistosomal cirrhosis, 5 of whom had ascites. The plasma volume was expanded in the schistosomiasis patients (65.8 ml/kg body weight), while the mean plasma albumin concentration (3.15 g/100 ml) was significantly lower than in the controls (4.2 g/100 ml); reductions were also seen in the half-life of the labelled albumin and the total exchangeable albumin (3.54 g/kg). Albumin in the extravascular pool was significantly diminished while that in the intravascular pool was unchanged. Escape of albumin into the tissues or its loss into the ascites fluid was excluded by the presence of hypoalbuminemia in 11 nonascitic and nonedematous patients. Increased loss of albumin through the gastrointestinal tract (due to portal hypertension) was felt to be an important factor in reducing the total body albumin in patients with schistosomiasis. The mechanism of this loss is thought to be a passive leakage of plasma proteins through the gastrointestinal mucosa due to an abnormal increase in the intestinal lymph beyond the drainage capacity of the lymphatic vessels.

5613 DISTURBANCES IN WATER AND ELECTROLYTE METABOLISM IN ALCOHOLIC CIRRHOSIS. *(Fr.)* Bergeron, A. (Fac. Med., Clermont-Ferrand, France). *Med Afr Noire* 15(5):233-234, 1968.

5614 A STUDY OF 100 CASES OF CIRRHOSIS IN BRUSSELS. I. SOCIOLOGICAL ASPECTS. *(Fr.)* Heimann, R. (Dept. Path. Anat., J. Bordet Inst., Brussels, Belgium) and D. Ardichvilli. *Acta Gastroent Belg* 31(2):112-122, 1968.

5615 A STUDY OF 100 CASES OF CIRRHOSIS IN BRUSSELS. II. MORPHOLOGICAL STUDY AND DISCUSSION OF THE VALIDITY OF THE HISTOLOGICAL CLASSIFICATION OF CIRRHOSIS. *(Fr.)* Ardichvili, D. (Dept. Path. Anat., J. Bordet Inst., Brussels, Belgium) and R. Heimann. *Acta Gastroent Belg* 31(2):112-122, 1968.

5616 CHANGES IN INTESTINAL PHOSPHATASE DURING CIRRHOSIS: HYPOTHESES AS TO THE PHYSIOPATHOLOGY OF ITS RETENTION IN THE BLOOD. *(Fr.)* Delcourt, R. (Lab. Med. Biol., A. Gailly Inst., Charleroi, Belgium). *Acta Gastroent Belg* 31(1):18-27, 1968.

5617 A LONG-TERM STUDY OF PATIENTS WITH PORTACAVAL SHUNTS. *(Fr.)* Hoenig, V. (Prague, Czechoslovakia), J. Filip and M. Brodanova. *Actualites Hepatogastroent Hotel Dieu* 4(2):B57-B59, 1968.

5618 A CLINICAL AND ANATOMICAL STUDY OF 72 CASES OF HEPATIC COMA: COMPARISON

BETWEEN THE BIOLOGICAL AND ELECTROENCEPHALOGRAPHIC FINDINGS. *(Fr.)* Mahoudeau, D. (Beaujon Hosp., Clichy, Paris, France), J. Dubrisay, J. F. Foncin and P. Pouillart. *Bull Mem Soc Med Hop Paris* 119(6):499-510, 1968.

5619 **CLINICAL APPLICATION OF THE EXTRACORPOREAL PERFUSION OF A HETEROLOGOUS LIVER: ATTEMPTED PURIFICATION OF THE BLOOD IN A CASE OF HEPATIC COMA.** *(It.)* Dagradi, A. (Inst. Surg. Anat., U. Padua, Italy), V. Puchetti, S. Radin and R. Petronio. *Chir Ital* 19(3):215-222, 1967.

5620 **CREATION OF COLLATERAL LYMPHATICS DURING THE SURGICAL TREATMENT OF PORTAL HYPERTENSION AND CIRRHOSIS OF THE LIVER.** *(Rus.)* Makshanov, I. Ia. (I. M. Sechenov 1st Moscow Med. Inst., USSR). *Arkh Anat* 55(8):79-84, 1968.

5621 **PRIMARY BILIARY CIRRHOSIS AND PRIMARY CUTANEOUS AMYLOIDOSIS.** *(Sp.)* Zelasco, J.F. (Luis Agote Inst. Clin. Med., Buenos Aires, Argentina), J. J. Guido, I. S. Capdevielle and M. D. Rodriguez. *Rev Asoc Med Argent* 82(6):208-213, 1968.

5622 **TWO CASES OF CIRRHOSIS WITH PARAPROTEINEMIA.** *(Cz.)* Fucikova, T. (Fac. Gen. Med., Charles U., Prague, Czechoslovakia) and J. Hoenigova. *Cas Lek Cesk* 107(6):184-186, 1968.

5623 **PATHOHISTOLOGICAL STUDY ON THE LIVER CIRRHOSIS IN DIABETES MELLITUS.** *(E.)* Hano, T. (Kobe U. Sch. Med., Japan). *Kobe J Med Sci* 14(2):87-106, 1968.

5624 **INTRAVENOUS ADMINISTRATION OF ASCITES FLUID WITH CONTROL OF THE CENTRAL VENOUS PRESSURE IN THE TREATMENT OF HEPATIC CIRRHOSIS.** *(Pol.)* Konturek, S. (1st Clin. Int. Dis., Acad. Med., Krakow, Poland), J. Dubiel and K. Moczurad. *Pol Tyg Lek* 23(48):1841-1843, 1968.

5625 **THE PRACTICAL TREATMENT OF HEMATEMESIS IN PATIENTS WITH ALCOHOLIC CIRRHOSIS.** *(Fr.)* Allannic, H. (Rennes, France), P. Toulouse and J. Paulet. *Clinique* 63(646):561-566, 1968.

5626 **GASTRIC SECRETION IN PATIENTS WITH CHRONIC LIVER DISEASE.** *(Ger.)* Schmidt, H. A. (Med. Clin., U. Marburg/Lahn, Germany) and G. A. Martini. *Deutsch Med Wschr* 93(40):1914-1921, 1968.

5627 **THE PATHOGENESIS AND TREATMENT OF ASCITES.** *(Ger.)* Dölle, W. (Med. Clin., U Marburg, Germany), W. Behrends, E. Buchborn, G. Esser, M. Földi and W. Schwartzkopff. *Aktuel Gastroent* pp. 113-132. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5628 **STUDIES ON THE LONG-TERM PROGNOSIS AND RESULTS OF TREATMENT IN CIRRHOSIS OF THE LIVER.** *(Ger.)* Wildhirt, E. (Munic. Hosp., Kassel, Germany) and W. Reichel. *Aktuel Gastroent* pp. 345-348. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5629 **STUDIES ON IRON ABSORPTION IN CHRONIC LIVER DISEASE.** *(Ger.)* Lindner, H. (German Red Cross Hosp., Hamburg, Germany), K. Halsmann, V. Fintelmann, H. C. Heinrich and H. Bartels. *Aktuel Gastroent* pp. 352-354. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5630 **URINARY ACID MUCOPOLYSACCHARIDES IN CIRRHOSIS OF THE LIVER.** *(Ger.)* Becker, K. (1st Med. Clin., U. Hamburg, Germany). *Aktuel Gastroent* pp. 356-358. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

5631 **ENZYMES CATALYZING ENERGY-YIELDING REACTIONS IN THE THROMBOCYTES OF PATIENTS WITH CIRRHOSIS OF THE LIVER AND SPLENOMEGALY.** *(Ger.)* Bode, C. (Med. Clin., U. Marburg, Germany), H. Goebell and H. Bickel. *Aktuel Gastroent* pp. 360-362. [Proc. 24th Meeting, German Soc. Dig. Metab. Dis., Hamburg, 1967]. Stuttgart, Georg Thieme, 1968. 376 pp.

See also abstract no.: 4841

5632 EFFECT OF CHOLESTYRAMINE ON CHOLESTEROL GALLSTONES IN MICE. *(E.)*

Bergman, F. (Surg. Clin., U. Umeå, Sweden) and W. van der Linden. *Acta Chir Scand* 134(3-4):287-290, 1968.

Previously formed cholesterol stones disappeared from the gallbladders of 5 of 17 male and female white mice within 6 months after they were switched from a diet containing 1% cholesterol plus 0.5% cholic acid (continued for 4 months) to one supplemented only with cholesterol; addition of 3% cholestyramine to the second diet resulted in the disappearance of gallstones from only 3 of 17 mice. When cholesterol was also omitted, gallstones disappeared within 3 months in 2 of 8 mice fed pure commercial laboratory chow and 4 of 9 mice fed laboratory chow plus 3% cholestyramine. Cholestyramine thus had no significant effect on the reabsorption of cholesterol stones, which took place in response to the simple withdrawal of cholic acid. In other experiments, however, cholestyramine was found to accelerate to disappearance of fatty livers and intrahepatic birefractive crystals of esterified cholesterol in mice which were switched from the cholesterol + cholic acid diet to one supplemented only with cholesterol, recovery being complete within 22 days.

5633 LIFE-THREATENING COMPLICATIONS AFTER OPERATIONS UPON THE BILIARY TRACT.

(E.) Holm, J. C. (Virginia Mason Hosp., Seattle, Wash.), L. H. Edmunds Jr. and J. W. Baker. *Surg Gynec Obstet* 127(2):241-252, 1968.

Among 1467 patients (1056 women and 411 men, including 323 patients over 65 yr of age) undergoing cholecystectomy for cholecystitis (98%) or obstructive jaundice (2%) at Virginia Mason Hospital between 1955 and 1965, 103 developed complications during the initial hospitalization and 13 died. There were 32 complications and 4 deaths among 590 patients receiving cholecystectomy alone, 28 complications and 2 deaths among 560 patients also subjected to operative cholangiography, and 43 complications with 7 deaths among 317 patients also subjected to common bile duct exploration (with cholangiography in 271 of 317). However, 37 of the last 43 complications developed among the 195 cases in which common bile duct exploration yielded positive results. The 53 complications arising in the operative field included 7 cases of pancreatitis (2 fatal), 2 cases of bile peritonitis (1 fatal), 2 fatal cases of septicemia, 2 cases of persistent tube drainage, 1 of cholangitis, 4 of subphrenic abscess, 9 of wound abscess, 14 of dehiscence, and 2 of wound hematoma. Complications outside the operative field developed in 50 patients, including 3 with ileus, 1 with acute bacterial enteritis and 1 with upper gastrointestinal tract bleeding, and caused 8 deaths (7 cardiovascular and 1 respiratory). Operative cholangiography is concluded to have no effect on the prognosis after cholecystectomy, and the increased morbidity following common duct exploration is ascribed to common duct involvement rather than to exploration *per se.*

5634 PROGNOSIS OF EARLY POST-CHOLECYSTECTOMY DISTRESS: ANALYSIS OF 593 PATIENTS CHOLECYSTECTOMIZED FOR GALLSTONE DISEASE. *(E.)*

Domellöf, L. (Cent. Hosp., Lidköping, Sweden) and T. Scherstén. *Acta Chir Scand* 134(3/4):291-295, 1968.

A repeated questionnaire study (1962 and 1965) of 593 patients (143 men, mean age 52 yr, and 450 women, mean age 49.1 yr) who had been treated by cholecystectomy (plus choledocholithotomy in 89, exploratory choledochotomy in 52, and operative cholangiography in 423 cases) for cholecystolithiasis (312 cases), cholecystitis (276 cases), or cholesterolosis of the gallbladder (5 cases) in 1960 revealed postcholecystectomy symptoms (pain, nausea, constipation and/or diarrhea) in almost the same number of patients at the 2-yr and 5-yr follow-up (167 and 163 cases, resp.). Postcholecystectomy symptoms were reported by a total of 222 patients (41 males or 28.7% and 181 females or 40.2%) on the two questionnaires, the degree of discomfort having remained unchanged between 1962 and 1965 in 30 cases, increased in 69 cases (including 14 with early symptoms and 55 who had no symptoms in 1962), and decreased in 123 cases (including 59 in which the complaints disappeared completely). There was no significant difference in development of postcholecystectomy symptoms between the various types of gallbladder disease (20-40.4%), but the rate was lower in patients with hyperdiastasuria at the time of operation (15.4%). It is concluded that the prognosis of early postcholecystectomy symptoms is fairly favorable. However, the disappearance of early symptoms is offset by the development of new symptoms in other patients during later years.

5635 GALLSTONES IN THE TEEN-AGER. *(E.)*

Mason, S. A. (921 8th Ave., Suite B, Fort Worth, Texas). *Southern Med J* 61(6):657-660, 1968.

Among a total of 150,000 admissions to a west Texas hospital over a 12-yr period, 19 teen-age patients were admitted because of cholelithiasis. All patients were white females, aged 15 to 19 yr; 16 were married and 3 were single. Six of the patients were quite obese. Numerous calculi were found in 16 of the cases. Treatment consisted of cholecystectomy in all but 1 instance. All patients did well postoperatively, with no mortality with either surgical or medical management. Cholelithiasis in this age group may occur with symptoms less typical than those customarily found in the adult population. The treatment of choice is cholecystectomy.

5636 THE DEFINITIVE VALUE OF PEROPERATIVE CHOLANGIOGRAPHY IN THE DIAGNOSIS AND TREATMENT OF OBSTRUCTIVE BILIARY TRACT DISEASE. *(It.)*

Barbieri, A. G. (Fatebenefratelli-Fatebenesorelle Hosp., Milan, Italy), W. Rossi, M. de Vecchi Pellati and G. Antognini. *Chir Ital* 19(3):223-242, 1967.

Following a careful discussion of the indications, goals, techniques, advantages and deficiencies of peroperative cholangiography in biliary tract obstruction, based on 226 such procedures carried out during a 7-yr period, the authors review their surgical experience with 1055 cholecystectomies for cholelithiasis and 92 operations on the bile ducts performed during 1959-66. The 92 biliary operations included 70 for cholelithiasis, 2 for biliary tract neoplasms, 2 for cicatricial stenosis, 2 for papillary sclerosis, 3 for biliary fistulas, 12 for pancreatic neoplasms, and 1 for sclerotic pancreatitis. The most common procedure was cholecystectomy + choledochotomy and drainage by Kehr tube

(53 cases), followed in order of frequency by cholecystojejunostomy (15 cases), cholecystectomy + choledochotomy + transduodenal sphincterotomy and drainage (15 cases), choledochotomy and drainage for recurrent or residual stones (11 cases), choledochoduodenostomy (6 cases), cholecystoduodenostomy for recurrent or residual stones (3 cases), hepaticogastrojejunostomy (2 cases), and choledochotomy + sphincterotomy and drainage for recurrent or residual stones (2 cases). Reasons are presented for the selection of these various procedures, and some of the techniques are outlined. There were only 3 deaths (2 due to cardiorespiratory failure and 1 to hepatic coma). Reoperation was necessary in 4 patients subjected to choledochotomy, and stones were left *in situ* in 4 cases, 2 of whom could be treated successfully by ether lavage. Per- and postoperative cholangiographic findings in 7 particularly interesting cases are illustrated and discussed, including 2 cases of cholecystocholedocholithiasis, 2 of postcholecystectomy choledochostenosis, and 1 each of residual intrahepatic cholelithiasis, postcholecystectomy sclerosis of the sphincter of Oddi, and adenocarcinoma of the ampulla of Vater.

5637 DISTURBANCES IN LIVER FUNCTION ACCOMPANYING ACUTE CHOLECYSTITIS. *(Pol.)*

Jankau, O. (Munic. Hosp., Slupska, Poland). *Wiad Lek* 21(9): 721-725, 1968.

Results of the BSP test, serum bilirubin, plasma proteins and serum transaminase levels were compared in 30 women (29-66 yr old) with acute cholecystitis (including 24 with a history of persistent symptoms for from 6 months to 10 yr) and 30 healthy controls. This comparison revealed a mild disturbance in liver function in the cholecystitis patients, with a decrease in plasma proteins (5.97 g% compared to 6.35 in controls) and serum albumin (3.17 g% compared to 3.84 in controls), a moderate increase in serum bilirubin (1.7 and 0.67 mg%, resp.) and BSP retention (13.5% and 5%, resp.), and a marked increase in serum transaminases (106-190 units compared to 10-26.5 units in controls). In the 24 patients who were treated by cholecystectomy, all the liver function tests except BSP retention showed a definite change in the direction of normal within 10 days after the operation, and all liver function tests were essentially normal 9 months after the operation in the 9 patients followed. Normalization of the liver function tests was more rapid in the 10 patients operated on within 5 days after admission than in the 14 patients operated on after a delay.

5638 BY-PASS ANASTOMOSES IN THE SURGICAL TREATMENT OF COMPLICATED CHOLECYSTITIS.

(Rus.) Viliavin, G. D. (A. V. Vishnevskii Inst. Surg., Acad. Med. Sci. USSR), E. V. Grishkevich, Ie. M. Bagnenko and V. A. Vishnevskii. *Vestn Khir Grekov* 100(5): 32-36, 1968.

Surgical techniques and indications for the use of by-pass anastomoses and shunts in the treatment of acute and chronic cholecystitis and recurrent biliary tract obstruction are discussed on the basis of experience with 114 cases: 100 treated by choledochoduodenostomy and 14 treated by high biliodigestive anastomoses. The 1st 100 patients, nearly all of whom had cholangitis and 70 of whom were jaundiced, included 59 with chronic cholecystitis, 11 with acute cholecystitis, and 30 with a postcholecystectomy syndrome. The immediate conditions necessitating choledochoduodenostomy were: stenosis of the ampulla of Vater (75 cases), accompanied in 59 cases by biliary stasis and microlithiasis, indurative pancreatitis (17 cases), stone in the ampulla (1 case), acute pancreatitis complicated by purulent cholangitis and edema (5 cases), and constriction of a previously created choledochoduodenostomy by scar formation (2 cases). There were only 3 deaths, and among 50 patients followed for 1-7 yr, 38 had a good result, 9 were in satisfactory condition, and in 3 there was no improvement. The other group of 14 patients, including 3 with external biliary fistulas, were treated for recurrent stricture or stenosis of the hepatic duct or extrahepatic bile ducts by hepaticoenterostomy with exclusion of the ascending loop of the small intestine and Mikulicz-Braun enteroenterostomy (7 cases), hepaticoduodenostomy (3 cases), hepaticocholedochogastrostomy (2 cases), or Longmire-Dogliotti hepatocholangiogastrostomy (2 cases). There were 2 deaths due to hepaticorenal failure, and 9 other postoperative complications. Results at follow-up 1-6 yr later were good in 7 cases, satisfactory in 3 and poor in 2. The indications for choledochotomy and particularly for choledochoduodenostomy are outlined, and it is concluded that the only contraindications to the latter procedure are: duodenal stasis and deformation due to duodenal scar formation, acute inflammatory infiltration of the wall of the common bile duct, obliterative hyperplastic cholangitis with severe stenosis of the hepatic duct, or an extremely poor general condition.

5639 GALLSTONE FORMATION IN THE CONVENTIONAL MOUSE: THE ROLE OF BACTERIA.

(E.) Frey, C. F. (U. Michigan Med. Ctr., Ann Arbor) and R. Freter. *Amer J Surg* 116(6):868-871, 1968.

To evaluate the possible role of bacteria in the gallbladder wall or bile in the process of gallstone formation, 98 3-week-old CD-1 Swiss mice were divided into 4 experimental groups and fed different diets for up to 6 weeks. The first group consisted of 36 mice fed the Notre Dame L-356 diet with additional cholesterol and cholic acid for 2, 4, and 6 weeks, after which they were sacrificed. The second group (20 mice) was fed the same diet without cholesterol and cholic acid for the same time periods. The 27 mice in group 3 were fed the L-356 diet with cholesterol and cholic acid for 3-4 weeks, while group 4 was given the diet without the added cholesterol and cholic acid for the same time period. Aerobic and anaerobic cultures of the gallbladder wall and bile of conventional mice on a lithogenic diet revealed no bacterial growth. Gallstones were not noted in the gallbladders of any of the mice with positive cultures. The inability to culture bacteria from the gallbladder wall or bile of mice on a lithogenic diet makes it unlikely that a bacterial nidus plays any role in gallstone formation in the mouse.

5640 PRIMARY NEOPLASIA OF THE GALLBLADDER.

(E.) Warren, K. W. (Lahey Clin. Found., Boston, Mass.), K. J. Hardy and M. G. E. O'Rouke. *Surg Gynec Obstet* 126(4):1036-1040, 1968.

Among 105 patients (78 women and 27 men, 35-86 yr old) treated for primary neoplasia of the gallbladder between 1923 and 1966, abdominal pain was the most common symptom, being present in 99 patients and being the only symptom in 35 patients; a recent change in a chronic pain was frequently noted. Although the average duration of symptoms was 24 months, this ranged from 24 hr to 20 yr, and 5 patients were symptom-free. Jaundice was noted in 43 cases. Cholecystography, performed in 34 of the 62 patients without jaundice, revealed a nonfunctioning gallbladder in 27. A preoperative diagnosis of cancer was made in only 5 cases. Gallstones were definitely present in 57 cases, absent in 6. Histological examination revealed adenocarcinoma in 63 patients and anaplastic carcinoma in 21. Metastasis involved the liver in 65 instances, the lymph nodes in 63, the common bile duct in 23, and the peritoneum in 22. Surgical procedures included cholecystectomy (23 cases), choledochostomy (14), both combined (16), and a variety of other operations. Regardless of procedure, 87 patients died within 1 yr after diagnosis and 14 survived 1 or more yr. The 5-yr survival rate was 6% (follow-up complete in 103 patients), and 4 of these 7 patients have survived for more than 10 yr.

5641 GALLSTONES: ETHNOLOGICAL STUDIES. *(E.)* Miyake, H. (Kyushu U. Fac. Med., Fukoka, Japan) and C. G. Johnston. *Digestion* 1(4):219-228, 1968.

Gallstones, removed at laparotomy after their location in the biliary tract had been noted, were collected from 3 different areas of the world (Hong Kong, 50 gallstones; Japan, 100 gallstones; and the United States, 50 gallstones) and subjected to quantitative chemical analysis in order to test the hypothesis that gallstones differ in composition in the Orient and the Occident. The results indicated that in the United States most gallstones are composed predominantly of cholesterol, and are found most frequently in the gallbladder, while in the Hong Kong Chinese population, bile-pigment stones predominate and are most commonly found in the bile duct. In Japan, both types of stones occur with equal frequencies; however, the proportion of cholesterol to bile-pigment stones is gradually increasing, thus approaching the ratio found in the West. Cholesterol and bile-pigment stones should be considered as 2 separate entities having different etiologies and resulting in different characteristic symptoms.

5642 LIVER FUNCTION STUDIES FOLLOWING SURGICAL INJURY TO THE COMMON BILE DUCT. *(E.)* Aronsen, K. F. (Malmö Gen. Hosp., Sweden), H. Grundsell and E. G. Ohlsson. *Acta Chir Scand* 134(6): 453-456, 1968.

Fifteen subjects, including 9 in whom the common bile duct had been partially transsected at operation and 6 in whom the duct had been completely transsected, were reviewed 9 months to 9 yr after the operation. The partial lesions were repaired by suturing and drainage of the common bile duct; the postoperative course was uncomplicated and no further operations required. In 4 of the 6 patients with complete transsection of the duct, several reoperations were required due to anastomotic stricture. The follow-up review included examination with the conventional liver function tests and with ^{131}I-Rose Bengal. None of the subjects with partial transsection of the duct showed any impairment of liver function. Persistent biliary stasis was found in all 6 patients with complete transsection of the duct, despite attempts to reestablish an unobstructed bile flow; hepatobiliary dysfunction was also revealed in 3 of these patients. This study indicates that transsection of up to 2/3 of the circumference of the common bile duct does not cause permanent damage to the biliary tract or liver.

5643 CHANGES IN THE ULTRASTRUCTURE OF GALLBLADDER EPITHELIUM IN RABBITS WITH EXPERIMENTAL GALLSTONES. *(E.)* Hayward, A. F. (Royal Free Hosp., London, England), J. W. Freston and I. A. D. Bouchier. *Gut* 9(5):550-556, 1968.

Male and female New Zealand rabbits fed a diet containing 0.75% dihydrocholesterol developed gallstones in 7-9 days. This was associated with the appearance in the bile of mucus which apparently originated in the gallbladder epithelium, even though the normal rabbit gallbladder does not contain mucus-secreting cells. Within 3 days on the dihydrocholesterol diet, and before the development of stones, intracellular droplets resembling mucus were observed in the epithelial cells. Intercellular vacuoles later appeared, lined with microvilli similar to the microvilli of the cell apices. Other changes included the build up of epithelial cells and the presence of basal granules, possibly indicating increased cell production and the presence of more immature cells. The interpretation of these findings remains unclear.

5644 VALUE IN PEDIATRIC PRACTICE OF AN ANTISPASMODIC AGENT ACTING SELECTIVELY ON THE SPHINCTER OF ODDI. *(Fr.)* Maincon, F. (Hosp. Ctr., Creteil, France). *Clinique* 63(646):591-594, 1968.

The choleretic antispasmodic agent Cantabiline was tried at a dosage of 1-3 capsules/day, usually for 10-15 days, p.o. in the treatment of 50 children (25 boys and 25 girls, 3.5-12 yr old) with various forms of biliary dyskinesia: 8 with viral hepatitis, 7 with obesity, 5 with food allergy, 7 with colitis, 2 with acetonemic vomiting, and 21 with dyspepsia (8 of whom also had signs of colitis). In addition to various types of diet, corticosteroids were also given to 5 of the 8 children with hepatitis, sedatives were given to 2 being treated for obesity, and antihistamines, antispasmodics or tranquilizers were given to 2 children with food allergy and 2 with colitis. Omitting the children with obesity, in whom the effect of the drug was difficult to judge, results were good-excellent in all 8 with hepatitis, 3 of 5 with food allergy, 6 of 7 with colitis, 1 of 2 with acetonemic vomiting and 11 of 21 with dysepepsia; the drug was totally ineffective in only 5 cases (1 of acetonemic vomiting and 4 of dyspepsia). There were no side effects except for occasional diarrhea, and the headaches which often accompany dyspepsia showed striking improvement.

5645 THE CONNEXION BETWEEN CALCIUM CONTAINING GALLSTONES, CHOLECYSTITIS AND STASIS. *(E.)* Bergman, F. (Dept. Path., U. Umeå, Sweden), W. van der Linden and H. Moëll. *Acta Hepatosplen* 15(5):326-330, 1968.

Chemical analysis of the gallstones from 200 consecutive patients operated on for cholelithiasis during 1966 revealed that 109 contained calcium (56 in the form of $CaCO_3$ and 53 in other forms) and 91 did not. A detailed comparison of the clinical and histological findings in patients with calcium- (or calcium-carbonate) containing stones and patients with calcium-free stones revealed no significant differences with respect to either previous cholecystitis (15 calcium cases and 18 calcium-free cases), jaundice (32 and 18, resp.), choledocholithiasis (18 and 11, resp.), visualization of the gallbladder (54 and 55, resp.), or degree of inflammatory change in the gallbladder mucosa. It is concluded that there is no relation between calcium or calcium carbonate and cholecystitis or cholestasis.

5646 BILIODIGESTIVE ANASTOMOSIS AT THE LEVEL OF THE HEPATIC DUCT IN THE RECONSTRUCTIVE SURGERY OF THE COMMON BILE DUCT: AN ANALYSIS OF 18 CASES. *(It.)* Nicora, E. (Galliera Hosp., Genoa, Italy) and C. Schenardi. *Rass Arch Chir* 5(5, Suppl. 1): 157-168, 1967.

Detailed case reports are presented for 18 patients (7 men and 11 women, 31-66 yr old) who received anastomoses between the jejunum and either the common (17 cases) or the left (1 case) hepatic duct in the treatment of obstructive jaundice due to cicatricial stenosis of the common bile duct. In all cases, surgery was followed by a thorough study of the blood picture and liver function, although biliary cholangiography was not always possible. Although the technique of Cattel was used in 4 cases involving the common hepatic duct, the technique of Roux is preferred and was used in the other 14 patients. There were two postoperative deaths. Of the remaining 16 patients, 14 survived in good condition while 2 died within 2 yr after surgery due to the development of cholangitis and biliary cirrhosis. Some of the surgical techniques required for this type of biliodigestive anastomosis are outlined.

5647 INDICATIONS AND RESULTS IN THE SURGICAL TREATMENT OF CHOLELITHIASIS. *(It.)* Vernetti, L. (Galliera Hosp., Genoa, Italy). *Rass Arch Chir* 5(5, Suppl. 1):120-147, 1967.

Between Jan. 1959 and April 1967, 2163 operations were performed for cholelithiasis at the Galliera Hospital, including 1889 cholecystectomies and 347 operations on the common bile duct; the latter included 279 cases of transduodenal sphincterotomy, 39 of common bile duct drainage and 29 of choledochoduodenostomy. Inflammation of the ampulla and sphincter was encountered in 193 cases (8.9%), including 73 with cholelithiasis of the gallbladder, 98 with choledocholithiasis, 12 with a history of cholecystectomy 3-9 yr before, and 10 with pancreatitis. Patients subjected to surgery on the common bile duct included 252 with choledocholithiasis (192 primary and 60 residual or recurrent after cholecystectomy), complicated in 86 cases by odditis and in 12 by stones in the ampulla. Surgical procedures in these patients included 184 transduodenal sphincterotomies, followed in 57 cases by choledochotomy and external biliary drainage and in 10 cases by choledochoduodenostomy. The postoperative mortality after cholecystectomy was only 0.2%, and there were no serious complications. Among the 279 patients treated by transduodenal sphincterotomy, there were 7 deaths (2.5%) and 39 with postoperative complications, including thrombophlebitis, melena, pancreatitis, hemoperitoneum, bile peritonitis, and cardiorespiratory or hepatorenal insufficiency. Among 202 patients operated on before the end of 1965, 128 could be followed, and among these, 96% had good-excellent results; although 4% had poor results (dyspepsia, diarrhea, necessity for strict diet), there were no recurrences. The radiological diagnosis of the biliary tract is reviewed and some details of the surgical techniques are presented. Transduodenal sphincterotomy is concluded to be a valuable operation, not only for disease of the ampulla or sphincter, but also in the treatment of choledocholithiasis and to guarantee effective biliary drainage.

5648 EFFECT OF ERYTHROMYCIN, SOME TETRACYCLINES, AND RIFAMYCIN SV ON THE EXTRAHEPATIC BILIARY TRACT. *(It.)* Benzi, G. (Inst. Pharmacol. Exp. Ther., U. Pavia, Italy), G. M. Frigo and E. Arrigoni. *Boll Chimicofarm* 107(8):477-486, 1968.

Erythromycin and rifamycin SV had a spasmogenic effect on the terminal portion of the isolated common bile duct of calves while the effect of tetracyclines varied; in about 50% of the preparations they had an excitomotor effect. There were no significant differences between the effects of tetracycline, chlortetracycline, and oxytetracycline. Erythromycin was about 1.3 times more active, and rifamycin SV about 3.4 times more active, than tetracycline. Depending upon the concentrations used, the antibiotics had different effects on the isolated gallbladder of the guinea pig and cat. Gallbladder motility tended to be inhibited by the tetracyclines and rifamycin SV and to be increased by erythromycin. The tonus remained unchanged or was reduced by the tetracyclines, was reduced or slightly increased by rifamycin SV, and was consistently increased by erythromycin. When added to fluid used to perfuse the bile duct *in vivo*, all antibiotics studied reduced the flow of bile in the guinea pig, cat, dog, and monkey (*Cercopithecus hamadryas*). This was probably due to a direct action on the biliary musculature since it was not blocked by pretreatment with sympatholytic, parasympatholytic, antihistaminic, antiserotoninic, or ganglioplegic agents. This *in vivo* effect on the extrahepatic biliary tract was independent of the effect on the duodenum. In their specific contractile effects on the guinea pig bile duct freed from normal connections with the intestinal musculature, rifamycin SV was 1.2 times, and erythromycin 4.5 times, as active as tetracycline. Rifamycin SV had the greatest spasmogenic effect on the terminal portion of the common bile duct. The concentrations at which this occurred were similar to those found in humans during therapy, but the experimental bile concentrations for the tetracyclines and erythromycin are rarely reached in humans.

5649 REOPERATIONS AFTER CHOLECYSTECTOMY. *(Ger.)* Hess, W. (Limmatquai 122-124, Zurich, Switzerland). *Wien Klin Wschr* 80(36):657-660, 1968.

An analysis of 138 reoperations in cholecystectomized patients showed that the most frequent causes of recurrent symptoms were overlooked stones only (22%), overlooked stones and papillary stenosis (25%), papillary stenosis only (11%), pancreatitis caused by papillary stenosis (9%), pancreatitis due to other causes (8%), strictures of the common bile duct (10%) and strictures of the hepatic duct (8%). Reoperations were completely successful in 116 cases (84%). Results were 96% successful where only a stone had to be removed, 89% successful in sphincterotomies, and 78% successful in hepaticojejunostomies. The overall mortality was 4.4%.

5650 CHOLEDOCHODUODENAL JUNCTION STENOSIS IN THE POSTCHOLECYSTECTOMY SYNDROME. *(E.)* Schein, C. J. (Montefiore Hosp., New York City) and T. C. Beneventano. *Surgery* 64(6):1039-1046, 1968.

Among 15 patients (2 males and 13 females, 32-92 yr old) treated by an incontinuity choledochoduodenostomy for post-cholecystectomy pain attributed to stenosis at the choledochoduodenal junction, 1-30 yr after cholecystectomy, 14 were completely relieved of their symptoms. Diagnosis was by means of timed i.v. and manometric cholangiography. There were no intraabdominal complications, and the patients remained well during follow-up of 1-8 yr. Postoperative barium-meal roentgen studies readily demonstrated the choledochoduodenal anastomosis and the hepatic radicals filled readily. Barium evacuated promptly, and the distal stenosed end of the common bile duct was visualized, confirming the indication for the bypass. Recanalization of the distal common duct has not occurred in any case.

5651 HOMOGENEOUS STATISTICS FOR FOUR YEARS OF BILIARY SURGERY IN ELDERLY PATIENTS. *(Fr.)* Salembier, Y. (27 Place de Tourcoing, Lille, France). *Acta Gastroent Belg* 31(1):28-36, 1968.

5652 FORMATION OF GALLSTONES. I. *(E.)* Hulten, O. (Acad, Hosp., Uprsala, Sweden). *Acta Chir Scand* 134(2):125-130, 1968.

5653 EFFECT OF TREATMENT ON LIVER FUNCTION DISTURBANCE IN PATIENTS WITH ACUTE CHOLECYSTITIS. *(E.)* Van der Linden, W. (Central Hosp., Ostersund, Sweden) and H. Sunzel. *Amer J Surg* 115(5):637-641, 1968.

5654 THE DIAGNOSTIC SIGNIFICANCE OF BLOOD SUGAR CURVES FOLLOWING A DOUBLE GLUCOSE LOAD IN PATIENTS PREVIOUSLY SUBJECTED TO CHOLECYSTECTOMY. *(Rus.)* Stroiev, Iu. I. (Leningrad Pediat. Med. Inst., USSR). *Sovet Med* 31(8):61-64, 1968.

5655 HEMOPERITONEUM AS A RARE COMPLICATION OF ACUTE CHOLECYSTITIS: CASE REPORT. *(It.)* Rossi, W. (Fatebenefratelli-Fatebenesorelle Ciceri Agnese Hosp., Milan, Italy) and B. Salvadori. *Chir Ital* 19(3):313-317, 1967.

5656 THE EFFECT OF ACUTE INFECTIOUS CHOLECYSTITIS ON THE RESORPTIVE CAPACITY OF THE GALLBLADDER AND ON HIGHER NERVOUS ACTIVITY IN DOGS. *(Ger.)* Lindemann, M. (Pavlov Inst. Physiol., USSR Acad. Sci., Leningrad). *Acta Biol Med Germ* 20(6):871-874, 1968.

5657 EXPERIENCES WITH THE "IDEAL CHOLECYSTECTOMY." *(Ger.)* Götze, H. (St. Gertrauden Hosp., Berlin-Wilmersdorf, Germany) and T. Götze. *Langenbeck Arch Klin Chir* 321(4):280-283, 1968.

5658 THE BASES, TECHNIQUES, AND CLINICAL SIGNIFICANCE OF PHYSICAL MEASURING METHODS IN BILIARY SURGERY. *(Ger.)* Von Brücke, H. (Wagna Distr. Hosp., Steiermark, Germany). *Langenbeck Arch Klin Chir* 321(4):334-348, 1968.

5659 RESULTS OF THE CONSERVATIVE TREATMENT OF RESIDUAL DUCTAL LITHIASIS FOLLOWING BILIARY TRACT SURGERY. *(Pol.)* Korfel, Z. (J. Sniadecki Milit. Hosp., Bialystok, Poland) and H. Dadan. *Pol Przegl Chir* 40(7):767-773, 1968.

5660 STUDIES ON FUNCTIONS OF GALLBLADDER AND PANCREAS IN PATIENTS WITH DIABETES MELLITUS. *(Jap.)* Tanaka, Y. (Sch. Med., Showa U., Japan), M. Ando, T. Ueno, M. Sano, T. Mituoka, F. Sugata and Y. Hatta. *J Showa Med Ass* 28(1):53-56, 1968.

5661 FOREIGN BODIES IN THE GALLBLADDER AND BILIARY TRACT. *(Ger.)* Müller, E. (Essen Clin., U. Ruhr, Bochum, Germany) and H. J. Broghammer. *Bruns Beitr Klin Chir* 216(6):572-576, 1968.

5662 SOME CURRENT PROBLEMS OF BILIARY TRACT SURGERY: INDICATIONS AND TECHNIQUE OF CHOLEDOCHOTOMY, INTRAOPERATIVE CHOLANGIOMANOMETRY, PRIMARY CLOSURE OF THE COMMON BILE DUCT. *(E.)* Krauss, H. (U. Hosp., Freiburg i. Br., Germany) and E. Kern. *Surgery* 62(6):983-987, 1967.

5663 THE POSITION FOR CHOLECYSTECTOMY. *(E.)* Rogers, N. C. (Milit. Hosp., Catterick, England), K. C. McDeown and K. H. Oldfield. *J Roy Coll Surg Edinb* 13(5):283-288, 1968.

5664 BILIARY STRICTURE. *(E.)* Aust, J. B. (U. Minnesota Med. Sch., Minneapolis), H. D. Root, L. Urdaneta and R. L. Varco. *Surgery* 62(4):601-608, 1967.

5665 THE "SILENT" [GALLSTONES]. *(E.)* Glenn, F. (New York Hosp., New York City). *Postgrad Med* 44(3):216-219, 1968.

See also abstract nos.: 4839,4861,5546

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BENIGN GASTROINTESTINAL NEOPLASMS

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GASTROINTESTINAL NEOPLASMS, BENIGN

and under

NEOPLASMS, BENIGN GASTROINTESTINAL.

In several cases, more than one term is used in the literature to express a single concept. To ensure consistency of indexing and facilitate complete retrieval, it was necessary to select one of these synonyms for indexing purposes. The SEE references have been inserted to guide the User to the preferred term.

The SEE ALSO references are designed to call the User's attention to related terms.

NUMBERS FOLLOWED BY AN ASTERISK (*) REFER TO ABSTRACTS IN THE TEXT. OTHER NUMBERS REFER TO CITATIONS ONLY.

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ABDOMEN PAIN
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